

UNIVERSITY
OF TORONTO

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Cray deficit forecast 'not acceptable'

The OCLSC continues to find new customers, despite difficulties

by Karina Dahlin

THE ACCUMULATED deficit of the Ontario Centre for Large Scale Computation (OCLSC), home of the Cray super-computer, was \$1.9 million last year, \$500,000 more than the previous year, according to financial statements presented to the Business Board Oct. 31.

Mid-year projections for 1988-89 show a \$950,000 shortfall and a further increase in the deficit.

"The forecast is not acceptable. Things are going to have to change," said Richard Criddle, vice-president (administration).

Criddle said forecasts of commercial sales will be revised and expenses further controlled. The Natural Sciences & Engineering Research Council

(NSERC) and the National Research Council are the best hope for a rapid infusion of revenue, he said.

Industrial clients have been harder to find than expected. A consultant's report, released in July and published as a supplement in today's *Bulletin*, says

the OCLSC has "no realistic prospect" of becoming a commercially successful service bureau operation.

The U of T centre, like comparable US operations, has had trouble generating sufficient revenue from the

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Sunnybrook-Wellesley merger will mean major changes

by Jane Stirling

A PROPOSED \$300 million health sciences centre will produce revolutionary changes in medical training and research at U of T.

The merger of Sunnybrook Medical Centre and the 76-year-old Wellesley Hospital to form the Sunnybrook Wellesley Health Sciences Centre will strengthen the hospitals' existing services and create new areas of expertise, Charles Hollenberg, vice provost (health sciences), told the Academic Board Oct. 27.

"Their programs and facilities are highly complementary and a single institution will be much stronger than two separate ones," Hollenberg said.

The board approved the merger and formation of the new centre at the meeting. Governing Council and the Ontario Ministry of Health must now consider the proposal.

Changes in education and research techniques resulting from the creation of the centre will benefit several fields, Hollenberg said. He cited the treatment of trauma and burns, musculoskeletal diseases (degenerative arthritis) and vascular disorders (angina and strokes).

Amalgamation of medical staff will facilitate cooperation and new program initiatives on aging, clinical epidemiology and child and maternal health care.

The centre will include a new building with facilities for both "wet" research in

the laboratory and "dry" research using computers.

The first phase of the five-level structure — two storeys below ground, three above — began last spring and will be completed by November 1989. The second phase includes construction of three more floors, but building dates have not yet been scheduled.

The Wellesley in-patient hospital facility will move to the Bayview site. The Wellesley Hospital will be replaced by a

See SUNNYBROOK : Page 2

U of T, OISE reach agreement

by George Cook

THE UNIVERSITY and the Ontario Institute for Studies in Education (OISE) have reached a new 10-year affiliation agreement, bringing to an end three years of uncertainty.

The agreement must be ratified by Governing Council, the institute's board of governors and, in conformity with the OISE charter, the Ministry of Education. If approved, it will take effect July 1, 1989.

The agreement provides for a continuation of the arrangement under which the University offers graduate degrees in education to students at the institute. However, in future, the graduate Department of Education will be a joint department of OISE and the Faculty of Education at U of T (FEUT).

At present, staff members at one institution cannot teach at the other unless they are cross appointed. Ac-

cording to the new agreement, cross appointment will no longer be necessary. In future, the chair of the graduate department will approve requests to teach at FEUT or OISE, thus facilitating interaction.

Research grants

The agreement also allows FEUT staff to apply for Ministry of Education research grants formerly open only to the staff of the institute, and OISE staff to apply for grants from the University's Connaught Fund.

The faculty and institute have also agreed to establish a Joint Centre for Teacher Development. It will cost about \$100,000 a year and be funded in equal measure by both institutions.

Dean Michael Fullan of the Faculty of Education said FEUT and OISE will begin the search for a director and associate director for the joint venture early in the new year. He said he expects the appointments to be made by March.

Fullan said the agreement also provides a framework for other joint programs. Early childhood education is a likely candidate for another such project.

OISE participates in joint programs with the University of Western Ontario and Laurentian University and is discussing proposed initiatives with two other Ontario universities.

OISE director Walter Pitman said the 10-year agreement — the longest in the history of the two institutions — will allow long-term development of cooperative programs. "Two- and three-year agreements just aren't long enough to let anything happen," he said.

The agreement was reached by a six-member Affiliation Review Advisory Committee. Lang, Fullan and Jim Keffer, vice-president (research) represented the University; assistant directors Jack House (planning and resources), Angela Hildyard (field services and research) and Malcolm Levin (academic) represented the institute.

In November, 1985, Ontario treasurer Robert Nixon said the provincial government wanted OISE to become part of U of T. While the government has never formally reversed its position, strong opposition from opposition parties, many Ontario school boards and OISE itself caused the plan to die a natural death.

Charges laid

ANN GROSVENOR, 49, a former administrative assistant in the Department of Clinical Biochemistry, has been charged with breach of trust and fraud over \$1,000 in connection with the disappearance of approximately \$170,000 in University funds.

Grosvenor has been released on her own recognizance and will appear in provincial court Nov. 16.

An internal audit conducted by the University indicated money was taken from a number of accounts in the Department of Clinical Biochemistry over an extended period of time, according to Robert White, assistant vice-president (finance). The loss was substantially covered by insurance.

A spokesperson for the Metropolitan Toronto Police said an investigation into the case began about a year ago.

There are extensive controls in place but if someone sets out deliberately to commit fraud then it is always possible, White said. "A situation like this is unusual for the University. Sadly, it's all too prevalent in business and industry."

Grosvenor was on staff at the University for 18 years.

New laser centre opens

THE FUTURE is looking bright for laser research.

Premier David Peterson joined University and industry representatives Oct. 27 to officially open the Ontario Laser & Lightwave Research Centre, located in the McLennan Physical Laboratories. The facility, which started last January, is one of seven centres of excellence founded in 1987 to promote long-term research in high-technology areas and create closer ties with industry.

Twelve U of T scientists are involved in research in five broad categories, including the development of new kinds of

See LASER : Page 3

Speaking
(and shouting)
out

Equipped with strong lungs, university students, staff and faculty descended on Queen's Park Oct. 31 to protest government underfunding of post-secondary institutions. The rally, sponsored by the Ontario Federation of Students, drew about 500 participants who also demanded action on overcrowding and lack of affordable housing. Politicians, including Lyn McLeod, minister of colleges and universities, spoke to the protesters but offered little to satisfy concerns.

\$1.8 million needed

THE UNIVERSITY must find \$1.8 million in its budget to help pay for the establishment of the Sunnybrook Wellesley Health Sciences Centre.

The total cost to U of T for the proposed \$300 million facility is \$3 million by current estimates, but a \$1.2 million health ministry grant will help defray some of this expense.

The remainder will come from the long-term adjustment fund, the operating budget or sources within the Faculty of Medicine, Charles Hollenberg, vice-provost (health sciences), told the Academic Board Oct. 27. "We haven't specified the exact source of this money," he said.

The University's \$3 million contribution will be directed specifically to the construction of the research centre. Cost projections are \$570,000 in 1988-89, \$1.5 million in 1989-90 and

\$930,000 in 1990-91.

While Academic Board members were generally in favour of the proposal, they expressed concerns about the University's contribution to costs.

Provost Joan Foley said details of the sources of funding will be presented to members in a proposal and will be subject to review by the budget committee.

Undergraduate representative Catherine Moroz said she favours the concept of amalgamation but worries that the closing of Wellesley will result in a shortage of hospital beds.

In response, Hollenberg said only 10 percent of the patients visiting the Wellesley emergency department require admission. "We won't be depriving the local community of frequently needed services." Patients who need care will receive a referral to another hospital.

Sunnybrook-Wellesley

Continued from Page 1

new community health facility, featuring ambulatory and out-patient services. The facility will offer new approaches to community health, drawing on the expertise of social workers, sociologists and health care workers. It will serve the St. Jamestown and Cabbagetown area.

Plans for the existing facility are still uncertain. Wellesley may sell the land it owns to the provincial government.

In five years, the centre will become virtually a fourth campus of the University — a multi-disciplinary health complex with an expansion of in-patient, research and teaching programs. U of T owns the Bayview Ave. lands and leases them to Sunnybrook Medical Centre.

Existing undergraduate, graduate and post-doctoral programs at both hospitals in the faculties of dentistry, medicine, nursing and pharmacy will be consolidated on the Bayview site.

The Faculty of Dentistry will use the centre for third- and fourth-year dental students and for a proposed hospital dental clerkship.

About 50 students each from the second-, third- and fourth-year medical classes will be located at the health

sciences centre annually.

It will also become a major site for both the undergraduate and graduate teaching programs of the Faculty of Nursing. Some 450 undergraduate students will receive at least part of their nursing practice there.

The centre will become a primary teaching site for the Faculty of Pharmacy's fourth-year clinical training program, involving 40 to 50 students. In addition, pharmacy plans to establish a program in drug education and research program there. While the campus will initially serve only the health science faculties, social work and engineering students will become involved at a later date.

Merger discussions have taken two years. In 1986, Wellesley and Princess Margaret Hospital considered the possibility of relocating to Sunnybrook to form a combined tri-hospital complex. However, in 1987 the minister of health announced that Princess Margaret will be moved to a site on University Ave., adjacent to Mount Sinai Hospital.

In December 1987 the University re-activated the negotiations by making a strong academic commitment to the proposed health sciences centre.

In Memoriam

Howard Frederick Andrews, professor of geography and director, Centre for Urban & Community Studies, Oct. 23. He was 44.

A native of London, England, Andrews received BA and MSc degrees from the London School of Economics and a doctorate from the University of Sussex. In 1969 he came to Toronto on a post-doctoral fellowship and in 1970 became a member of the geography department at Erindale College.

During his 18 years at U of T Howard Andrews held several administrative posi-

tions: he was associate dean (social sciences) at Erindale from 1975 to 1980 and served as vice-principal (academic) of Erindale in 1979-80; from 1980 to 1983 he was director of the Child in the City Programme and from 1987 onward he headed the Centre for Urban & Community Studies, first as acting director and then as director.

In recent years Andrews' teaching and research interests included those in third-world countries, and the origins and evolution of social geography in France of the late 19th and early 20th

centuries. He was active in communicating research findings in many international conferences and published in both English and French.

To honour his passionate interest in music, the Howard F. Andrews Memorial Prize has been established in the Faculty of Music, to be awarded annually to an outstanding player in the University of Toronto Symphony Orchestra. Donations may be sent to the fund through the Office of the Dean, Faculty of Music. All gifts are eligible for income tax receipts.

1988 Chancellor's Award

SARAH CHERIAN, the winner of the 1988 Chancellor's Award, knows what job satisfaction is. She puts in long hours as graduate admissions and programs officer at the Department of Electrical Engineering, where she is a "den mother" for 300 graduate students. Still, she shows no sign of stress or disgruntlement.

Cherian came to Canada in 1969 from her native India and began her career as secretary at electrical engineering. She has advanced professionally and has been offered jobs outside the department, but has always declined.



Sarah Cherian

"I am very happy with the department and with the people here. It's like my own home."

The Chancellor's Award is given by the University of Toronto Alumni Association. It recognizes a long, distinguished contribution by a staff member of the University. Cherian will receive her award at the Nov. 25 convocation. On Dec. 6 a dinner is planned in her honour in the Music Room of Hart House.

Professor Emeritus P.E. Burke said in his letter of support for Cherian that while he was interim graduate coordinator in 1979, he relied on Cherian's knowledge and good judgement. Half way through his term he was convinced she had the wherewithal to be graduate coordinator, despite the fact that she is not an academic.

One of Cherian's supporters this year was Efrem Habteselassie, a former graduate student in the department. In his letter, Habteselassie commended Cherian for instantly remembering his name whenever he called the office with a question. "It is very refreshing to know that I was not lost in the shuffle of numbers despite the large quantity of names and problems that Sarah must handle every day," he wrote.

Outside the University, Cherian volunteers as a telephone counsellor for the 700 Club and for the Queensway Cathedral. She and her family are also members of the Peel Kerala Association, an East Indian social and cultural organization.

Cray supercomputer

Continued from Page 1

commercial sale of supercomputer time. The consultant's report attributes low sales to "the immaturity of the environment."

However, it says the centre can still "play a vital role in introducing Ontario and Canadian industry to the benefits of supercomputers and in the process generate some needed operational revenue."

The deficit is attributable to overly optimistic market forecasts and a lack of federal support, said OCLSC director Lloyd Parker.

Two years ago, before the Cray was installed in the McLennan Physical Laboratories, the University expected the federal government to contribute between \$500,000 and \$1 million. In fact, there was no federal support in 1986, Parker said.

The following year, NSERC contributed \$150,000 and has allocated \$194,000 for 1988-89.

Since 1986, the provincial government has contributed \$18 million to the establishment and operation of the OCLSC.

If the centre's computational capacity is to remain competitive, the Cray must be replaced by 1992 with a newer and faster machine — at an estimated cost of \$30 million to \$35 million. Criddle said the federal government would probably pay for the new computer.

Buy shares

Despite difficulties, the OCLSC continues to find new customers. Recently it received a letter of intent from a Canadian corporation to purchase \$250,000 worth of supercomputer time.

The company will become the centre's first "industrial partner" by purchasing a share of time over one year for its choice of projects. "Walk-in clients" buy blocks of time for particular projects.

At present, six companies are making use of the supercomputer. They pay between \$1,000 and \$2,000 an hour, while the cost to academic users is \$100 an hour.

The Ontario Ministry of the Environment is the largest non-academic client. It purchases time for the development of acid rain models for projects involving the US and West German governments.

Magna International has done structural analysis on the Cray as well as engineering design for automobile doors. More business is expected from the company as it implements its plans for a sports car.

Several groups from Ontario Hydro have an account with the centre and more private companies are expected to make use of the \$13 million computer in the future.

Universities are the Cray's biggest users. OCLSC has about 180 active accounts. Approximately one-third are with Ontario universities, one-third with those outside the province. U of T researchers account for the rest.

"October was our top month in terms of hours. We ran more than 900 processor hours," said Parker.

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"THE PROCESS OF DISCOVERY"
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Trinity delays appointment

Independent review of Hewitt case agreed to

by Jane Stirling

TRINITY COLLEGE has delayed the appointment of an American professor to its divinity school while it continues negotiations concerning the Marsha Hewitt case.

In an Oct. 21 memorandum to Trinity's executive committee, Provost Robert Painter and James Baillie, executive committee chair, recommended postponement of the decision to appoint Professor Romney Moseley to the position both he and Hewitt are seeking until the college carries out an inquiry.

Meanwhile, Trinity has agreed to hold an independent review of the charges of

discrimination Hewitt has brought against the college and its dean of divinity, Peter Slater.

"We want to signal to the community that we're prepared to investigate the charges in an open way," Painter said. "We made a legal commitment to Dr. Moseley, but a moral commitment [to Hewitt] may over-ride this." He said he hopes the matter can be resolved in the next six weeks.

Hewitt has filed a complaint with the Ontario Human Rights Commission alleging that she was denied a tenure-stream position at the college due to discrimination on the basis of gender, marital and family status. She was hired

in 1986 on a three-year contract.

The college says Hewitt, a theology professor, should withdraw her complaint to the commission. If she doesn't, "the executive committee might decide to tell Dr. Moseley it hopes he will join the Faculty of Divinity as soon as possible," the memo says.

Terms "unacceptable"

Hewitt's lawyer, Suzie Scott, executive director of the U of T Faculty Association, said many of the proposed terms of the inquiry are "totally unacceptable." The college's suggestions represent no more than a starting point for negotiations.

"If we can't get fair terms, the matter won't be settled," Scott said.

Hewitt has not dropped her complaint to the Human Rights Commission.

The October memo suggests two approaches to the inquiry: one if Hewitt agrees to its terms — which include dropping her complaint — and another if she doesn't concur with the terms.

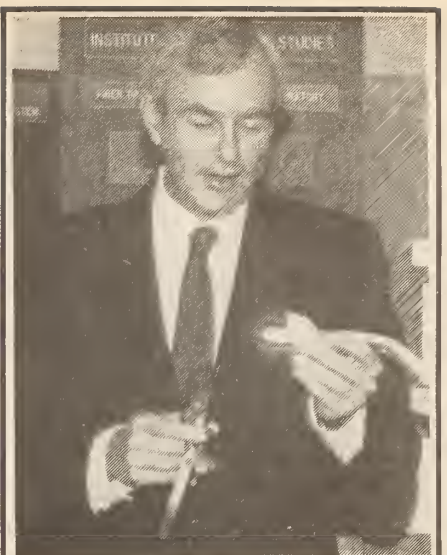
In either case, the college says it will establish a three-person panel of inquiry, at least two of whose members will come from outside the college.

If she agrees, both she and Slater will participate in recommending panel members. If not, neither will take part in the recommendation process.

If Hewitt drops the complaint, the panel may be asked to decide whether the search process was flawed and, if so, in what respects and to make recommendations to the executive committee.

If she pursues the complaint, the panel will investigate the question of whether Trinity was under a binding commitment, through oral or written representations, to appoint her.

The establishment of a satisfactory grievance procedure for members of the college's divinity school is also at issue. At present, the teaching staff in the Faculty of Divinity cannot launch grievances on hiring decisions. Those in its Faculty of Arts & Science can, as can faculty members at U of T and St. Michael's and Victoria Colleges.



Premier David Peterson examines the fibre optic "ribbon" that he cut to officially open the laser centre.

Laser centre

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lasers. They are also using lasers for studies of molecular structures, information processing, fibre-optic communications, materials testing and medical applications.

The combination of University research and industrial development has already produced results. Lumonics Inc., based in Kanata, Ont., will develop a prototype of a laser conceived by Professor Boris Stoicheff, one of the principal investigators, and his research associate, Tom Efthimiopoulos, a visiting professor from Greece. Their laser will emit shorter wavelengths than others currently available and could be useful in creating better computer chips, said Margaret Grisdale, centre administrator.

In addition to establishing new research programs through the principal investigators and their academic or industrial collaborators, the centre encourages the participation of academic, medical, government and industrial scientists by providing a Central (Equipment) Facility. This facility provides laboratory space for research experiments and feasibility studies and offers a wide range of laser and optical instrumentation to be used for short periods of time.

Political science celebrates 100 years

THE DEPARTMENT of Political Science is 100 years old this week. To celebrate, it will hold two panel discussions and a reception, hosted by President George Connell and his wife, Sheila, followed by a dinner in the Great Hall of Hart House.

The panel discussions — "Contemporary Perspectives on Democracy" and "Political Economy in Transition" — will take place in the Hart House Debates Room. The first begins at 2 p.m., the second at 3.45 p.m. Friday, Nov. 11.

Registration forms are available from the department, Sidney Smith Hall, 100 St. George St. For more information call 978-3450.

Political studies began at U of T with the University Federation Act, which

provided for the teaching of political science, including economics, jurisprudence and constitutional law. W.J. Ashley became the University's first professor of political economy in 1888 and delivered his first lecture — "What is Political Science?" — on Nov. 9 of that year.

Since its inception, the department has grown and changed. Called the Department of Political Science from 1892 to 1924, by the 1930s it was the Department of Political Economy. In 1982 it was divided into three different entities: political science, economics and the commerce and finance program.

From one faculty member in 1888, it has grown to include more than 70 today, 56 of whom teach full-time.

Student housing shortages remain a serious problem

THE UNIVERSITY "must move as fast as humanly possible" to end student housing shortages or suffer recruitment difficulties in the future, says the dean of the Faculty of Law.

Speaking to members of the Academic Board Oct. 27, Robert Prichard emphasized the sense of urgent necessity of developing a student housing policy.

"There's a sense of importance that must be placed on this issue for the next five to 10 years. It concerns our success in recruiting the best possible students across Canada," he said.

In an initial response to the report of the Provostial Advisory Committee on Student Housing Policy, the board decided that:

- the purpose of providing and maintaining on-campus housing is to support the educational and academic needs of the University community
- the educational and developmental values of residence living for full participation in the University should be given most weight
- in providing future places and in the redistribution of existing places, the principle of equity should apply.

Recommendations for a new student housing policy will be brought to the University Affairs Board, Nov. 29.

Build more

Principal John Browne of Innis College said there is enough information in the provostial report and a consultant's report to suggest that more buildings are needed.

"I don't think we'll be caught out by having unfilled beds somewhere down the road," he said.

Provincial statistics contained in a recently completed report for university housing officers show that 19 percent of full-time undergraduate students stay in residence. If this became the U of T benchmark, a total of 4,500 beds would be required.

Currently, there are about 2,800 undergraduate spaces for arts and science and professional faculty students on the St. George campus, excluding fraternities and campus cooperatives.

The Faculty of Law has "particularly acute" housing needs because one-third of its students attend from outside the province, Prichard said.

Male law students can apply to Devonshire House but there is no residence space available on campus for women in the faculty. "This exclusion of women from residence spaces reflects historical discrimination of women in the professions. We must move on this before we get publicly criticized," he said.

James Hoch, vice-president of the Graduate Students' Union, said the recommended limits on residency in the provostial report would, if implemented, adversely affect graduate students.

If campus tenancy were limited to the completion of the first graduate degree, PhD students would suffer, Hoch said.

"Student housing is a right, not a reward," he added.

Funding problem is federal concern: McLeod

THE ONUS is on Ottawa, not Queen's Park, to ensure that Canadian universities are as well funded as their American counterparts, says Lyn McLeod, Ontario minister of colleges and universities.

A recent study from the Council of Ontario Universities (COU) shows that the US government provides more money for higher education than the Canadian government does, McLeod said.

"I believe there's a very strong message for the federal government in the COU study," she said. "The federal government really has to address the issue of significantly different levels of funding for post-secondary education."

McLeod made her remarks to reporters Oct. 26 at the Park Plaza hotel, where she attended a conference, organized by her ministry, on the relationship between universities and community colleges.

Ed DesRosiers, COU's director of research and author of the study, said the provincial government cannot on the one hand insist that our universities be globally competitive and on the other fail to accept responsibility for adequate financial support.

COU acknowledges the existence of the Canada-US federal funding gap, but points out that individual states bear a greater part of the burden than Ontario

does. They provide about \$2,500 more per student to public universities than the province.

In Canada, a significant portion of university funding is provided by the federal government under the Established Programs Financing arrangements. In the US, no such program exists. President George Connell said a good case can be made for increased federal funding for research, but he took issue with McLeod's view that Ottawa is solely responsible for closing the funding gap.

According to the constitution and under the current cost-sharing arrangements with Ottawa, the provinces are responsible for operating and capital grants to the universities, Connell noted.

McLeod also told reporters that private institutions in the US absorb many students, while in Ontario, all students attend publicly funded institutions. Canada has no comparable private institutions.

In response, COU says that if Ontario universities are expected to compete internationally, they must be able to do so with both public and private institutions.

"We've chosen public support over private. So if we still want to be competitive, it will cost us more," DesRosiers said.

Correction

AN ARTICLE in the Oct. 24 *Bulletin* said the U of T local of the Canadian Union of Educational Workers, representing teaching assistants, "will decline to discuss wages until workload and hiring grievances have been settled or dropped." In fact, the union's willingness to discuss compensation with the University is not contingent upon the settlement of other issues, CUEW says. In a survey conducted by the union, 125 respondents said their academic supervisor also supervised their teaching, not 70, as reported.



PRESIDENTIAL SEARCH COMMITTEE CALL FOR NOMINATIONS FOR MEMBERSHIP

Nominations are invited for membership on the Presidential Search Committee which will begin its work in early 1989.

The composition of the Committee is:

- 1 The Chairman of the Governing Council or a lay member of Council appointed by the Chairman (Chair of the Committee)
 - 2 Appointees of the Lieutenant-Governor-in-Council to the Governing Council
 - 3 Alumni of the University, who are neither staff nor students of the University
 - 5 Members of the teaching staff of the University, no more than two of whom may be current holders of academic administrative posts
 - 1 Member of the administrative staff of the University
 - 3 Students (one full-time undergraduate, one part-time undergraduate and one graduate student)
- 15

Anyone from the University community may submit a nomination for any of the categories of membership on the Committee. Nominations should include a summary of relevant University experience, a statement concerning the individual's qualifications with respect to the work of the Committee and confirmation that the individual is willing to serve.

Nominations should be sent to Dr. J. G. Dimond, Secretary of the Governing Council, Room 106, Simcoe Hall, by **Friday, November 25** at the latest. Anyone having questions about the nominating process or the Search Committee should contact Dr. Dimond at 978-2117.



The Food Services Advisory Committee has been established with the following terms of reference:

To recommend a policy that will serve as the context for evaluation for the current caterers' services provided to the University of Toronto's community. Certain issues will be examined such as:

- Duties of service
- Convenience of location
- Staffing
- Desirability and variability of student's needs in residence
- Number of units on campus
- Variety of cash units types
- Catering business
- Price levels
- Financing policy
- Environmental concerns

The committee would like to invite any persons who have information, ideas or opinions on food services policy on any aspect of the Committee's terms of reference, to communicate them by November 30, 1988 in writing to:

Ms. Robin Toderian,
Secretary,
Food Services Advisory Committee,
Room 240,
Simcoe Hall,
University of Toronto

Draft statement needs work: critics

IN RESPONSE to concerns that the draft Statement of Institutional Purpose presents the University as "smug" and "self-congratulatory," the Academic Board has decided to extend the process of consultation.

At its Oct. 27 meeting, board members agreed to table the matter to allow time to circulate the document throughout the University community. It is printed in full on pages 9 and 10 of this issue of the *Bulletin*.

"This either is or is not an important document for the University," said Principal Ronald Williams of Scarborough College. "If it is, there should be a possibility for widespread reaction from the University at large."

The draft statement lists U of T's objectives for the 1990s and early 21st century. Designed to replace the 1973 statement, it highlights four areas — research, teaching and learning, public service and the University community.

In its preamble, the document says that U of T has earned an international reputation for excellence. The University's continuing aim is to justify that high reputation and to find new ways of enhancing it.

The statement also cites U of T's "distinguished academic record," a library "that is the largest in the country and among the best in the world" and "extensive laboratory and research facilities."

Despite assurances from Provost Joan

Foley that the document is intended mainly for administrative purposes and not as a public relations statement, some members were not satisfied.

"I do think it's excessively smug and will cause us harm," said Principal Desmond Morton of Erindale College. "I'm worried that this will become an internal statement for administration."

John Hastings, associate dean, community health, said the document is self-congratulatory. "The statement says what a fine lot we are here at the University. It makes us feel warm and cozy and we can say 'isn't it nice to work in such a fine place.'"

The University's statement should reflect a clearer vision "of who we are, where we're going and our image," Hastings said.

Dean Robin Armstrong of the Faculty of Arts & Science said the statement should take into account the realities facing U of T. Many of the stated objectives contained in the draft document — for example, the emphasis on undergraduate counselling and a commitment to excellence in teaching — are difficult to attain with current provincial government policies.

"The undergraduate objectives would represent a significant change from what we do now," Armstrong said.

The statement will be brought forward again at the next Academic Board meeting Dec. 1.

New constitution for continuing studies

A REVISED constitution for the School of Continuing Studies, altering membership in its council, was approved by the Academic Board Oct. 27.

"The new constitution reflects a different and more operable structure," said Provost Joan Foley in a letter to board chair Mike Uzumeri.

Formerly, membership was drawn from a set of wide, but fixed constituencies throughout the University and the community.

"There were difficulties in finding interested and knowledgeable appointees, in attaining a quorum and in attaining clarity of purpose and procedure," Foley noted.

School director Jacquelyn Wolf said the new council will be "a workable size with greater flexibility for external and internal representation."

According to the revision, the membership will be composed primarily of school staff and faculty.

However, annual appointments will be made from other appropriate academic and community areas. There will also be advisory committees whose membership will be drawn from University departments, as well as from professional associations and other public, private and non-profit sector groups to assist in program areas.

Members of the council will include the president (ex-officio); the provost or delegate (ex-officio); the director of the School of Continuing Studies (ex-officio); senior tutors, tutors and other continuing term or tenured academic members of school staff; program coordinators, assistant program coordinators, assistant directors, the registrar and secretary of the school; one member to be elected annually by and among administrative staff of the school; two members of the school's sessional instructional staff; and members from other faculties, schools or academic services as may be recommended by the council on an

annual term.

The council is empowered to serve as the authority for policy on school programs, serve as an advisory body to the school's director, review and deal with reports of standing or ad hoc committees, make rules for governing the council's proceedings, determine the composition of the council, award scholarships, bursaries, prizes or other awards and hear and determine academic appeals by students.

It will meet at least three times annually, in September, January and May and at the call of the chair.

Review committee Centre for International Studies

A COMMITTEE has been established to review the Centre for International Studies. Members are: Professor J.S. Cohen, assistant dean, School of Graduate Studies (*chair*); Professors G.A. Smith, acting associate dean, social sciences, Faculty of Arts & Science; M.A. Chandler, chair, Department of Political Science; T.J. Colton, director, Centre for Russian & East European Studies; H.N. Janisch, Faculty of Law; Janice Gross-Stein, Department of Political Science; and H.C. Eastman, Department of Economics; and Helen Vreugdenhil, graduate student, Department of History; and P.J. White, School of Graduate Studies (*secretary*).

The committee would be pleased to receive comments or submissions from interested persons. These should be forwarded by *November 30* to Professor J.S. Cohen at the School of Graduate Studies, 65 St. George St.

Aggressive attitude needed for new international projects

by Karina Dahlin

THE UNIVERSITY and OISE should take note of how other Canadian universities are competing aggressively in Ottawa and on the international scene to secure and fund new international cooperative projects, says Dean Tom Robinson of the School of Graduate Studies.

Earlier this year, Robinson took an administrative leave and, after three months of planning and preparation, spent two months visiting 18 universities in India, Pakistan, China, Thailand, Uganda, Kenya and Tanzania.

He wanted to learn more about the social, cultural and economic background of their students and to assess the usefulness of their Canadian academic degrees.

The third-world universities found that their students received a high quality education at OISE and U of T. But not all were satisfied with the relevance of the thesis topics chosen by the graduate students.

"I strongly resisted the suggestion that universities-of-origin should have the final or the major say in the choice of

thesis topic," Robinson said in his report on the trip.

"Most universities seemed happy with my suggestion that students coming to Canada bring with them advice from their own university on the sorts of thesis topic that would be relevant to the student's home territory."

Overseas contacts

Robinson also wanted to evaluate a number of academic exchange agreements and cooperative projects between U of T, OISE and the other universities.

The University has dozens of overseas commitments. The major initiatives are funded by the Canadian International Development Agency (12) and by the International Development Research Centre (6). Robinson studied, among other enterprises, a soil erosion project at Moi University in Kenya; the training of doctors and researchers from the West China University of Medical Sciences in Chengdu, and the development of electric power in a project with Xi'an Jiaotong University in China.

"It was gratifying to see the range of international contacts enjoyed by U of T and OISE. But a great deal more could clearly be done by both institutions to maintain and enhance the various cooperative links they now have," Robinson said.

Create institute

Robinson's report endorses an earlier proposal for the creation of an Institute of International Programmes. The institute was proposed last June by a committee headed by Professor Don Moggridge of the Department of Economics. Provost Joan Foley is now assessing the responses to the report before she presents recommendations to the Academic Board this fall or in early 1989.

Funding for the institute could come from Breakthrough, the University's fundraising campaign. The report suggests that \$2 million over a 10-year period would provide for an assistant vice-president of international programs who would act as director of the institute. The money would also enhance other programs, for example those of the Centre for International Studies.

A report also recommends the restructuring and re-naming of the Office of International Cooperation. The new Office for International Programmes would be responsible for activating, integrating and focusing the University's international programs.

One of the problems in the existing structure is that faculty members are sometimes unaware of potential funding for international projects, says the Moggridge report.

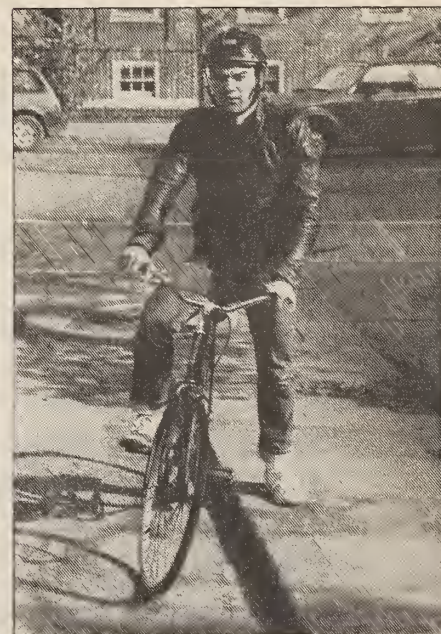
Underfunding and differential fees for visa students, introduced in 1977, are other concerns.

Many of the University's most effective external links are created by graduate students from overseas studying in Toronto and by the international activities of U of T graduate students in the field in the course of their research. "Yet, existing conditions inhibit the creation, much less the maintenance, of such links," says the report.

This year, a new Canadian graduate student pays \$1,771, while a foreign student pays \$8,133. Last year, to help attract good students, the Ontario government allowed the School of Graduate Studies to waive the differential fee for 270 foreign students. In 1987, there were 843 foreign graduate students at U of T, 775 in 1986-87 and 864 in 1985-86. The figure for this year has yet to be tallied, but it will probably be lower than last year's, says the registrar's office.



Big wheels on campus



PHOTOS: PETER LEGRIS

Editor's Notebook

Trick, or treat? The Business Board met last on Halloween. Maybe that's why board member **Robert McGavin** decided to play the devil's advocate when talk turned to the decrepit ventilation system at the Best Institute. "How important is the Best Building?" he asked, tongue-in-cheek. Mightn't the real solution involve demolition rather than renovation?

President George Connell intervened to remind those in attendance that the building is within view of Ontario treasurer Bob Nixon's Queen's Park office, that it houses the Department of Medical Research and is home to a group of accomplished scientists.

* * *

Enrolment? It's a big problem at Vienna Wirtschaftsuniversitat (WU), one of Europe's biggest and most important business and economics schools. It recently started a "negative" publicity program, according to *The Times Higher Education Supplement*, as a way of dissuading "poorly informed and wrongly motivated" students from furthering its "deterioration" by studying there. Among the statements used in its ads: "Don't believe all horror stories. The drop-out rate among WU students is only 63 percent."

* * *

Coat of arms, continued. You may remember the suggested coat of arms from our July 25 issue, showing the oak tree sheared off at the roots, "honouring" the trees cut down on Philosopher's Walk this summer. Now someone has suggested this new one, complete with a tiny oak tree on top to represent the tree that was recently planted on U of T Day.

* * *

Jon Van Loon and **Mary Agnes Balicki** were recently featured in *Profile*, a publication of the Ontario Ministry of Labour's Handicapped

Employment Program. Van Loon, who is dyslexic, teaches geology at U of T. Balicki, who suffers from rheumatoid arthritis, is the senior technician of the Inductively-Coupled Plasma Laboratory at the Institute for Environmental Studies. Both tend to underestimate their talents in coping with severe handicaps. "I can't remember a time when I wasn't in pain. It's just a matter of degree. But I don't let it inhibit me, because then people might say, 'See, you shouldn't have hired her in the first place,'" said Balicki.

* * *

The Ben Johnson fiasco has all the makings of Greek tragedy, says **Derrick de Kerckhove** of St. Mike's and the McLuhan Program in Culture & Technology. Johnson was touted as a star, the representative of Canadian culture, the fastest man in the world. His archrival was the feared American Carl Lewis. Then comes the ultimate drama, the Olympics, with the whole world watching. Both the main characters, it could be argued, suffer from hubris. Johnson's tragic flaw, you ask? That's easy — steroids, leading to the fall. He then slips into "outlaw conduct," the alleged pointing of the starting pistol at a harmless driver. We all shared the spectacle, says de Kerckhove, "but we're still waiting for the catharsis."

* * *

You read it here first (and second). One of our faithful readers brought the following typo (from the story "Renewal Responses Released," October 11) to our attention: "One answer may be to abolish the three-year degree in order to make room for both intensive training in a discipline and a carefully constructed breath requirement." We have great breadth of knowledge over here at 45 Willcocks but every once in a while we get the breath knocked out of us. The reader mentions that she has sent our blooper on to that infamous column "Marginalia" in *The Chronicle of Higher Education*. Rats!

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Architecture back on track

by Karina Dahlin

"THE WORLD does not need famous architects, it needs a whole lot of competent architects. We should produce inspiring and aspiring people with a deep-rooted sense of the craft."

With this sense of mission, Anthony Eardley started his new job July 1 as dean of the School of Architecture & Landscape Architecture.

For 20 years the U of T architecture program has been plagued by problems. Two years ago it got a new lease on life when Governing Council rejected a recommendation to close the Faculty of Architecture & Landscape Architecture and decided instead to replace it with the new school in 1988.

Eardley believes the school will survive — "I wouldn't be here if I didn't," he said in a recent interview — and flourish. Of modest size, the school has 264 students of architecture, 75 of landscape architecture, eight students working on master's degrees and a faculty of 68. Eardley likes it that way. "Big schools are machines," he said. "It's important that a school be small because people can get to know each other. Fifty percent of what you learn is from your fellow students."

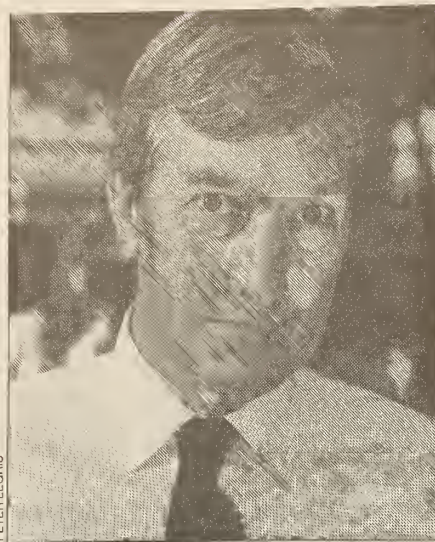
Troubleshooter

Eardley is an experienced troubleshooter. He became dean of architecture at the University of Kentucky in Lexington in 1973 when the department was floundering with little hope for a bright future. When he left, 15 years later, the school had acquired an excellent reputation in the US and abroad.

At 55, Eardley had been looking forward to joining the faculty of an architecture school and going into private practice. Ambition is one reason he postponed his plans and accepted the offer of a seven-year appointment here. Another is that he was invited by U of T several times to apply for the job. "It is very flattering to be asked," he said.

The move to Toronto was a natural progression. He left England in 1965 to go to the United States "for a six-month visit which has yet to be concluded."

Eardley received his diploma from the Architectural Association School of Architecture in London in 1958. Three years later he received his MA from Cambridge, where he was a Nuffield Research Fellow. He returned to the AA school in London to teach before accepting jobs at Washington University in St.



Anthony Eardley

Louis, Princeton, the Cooper Union for the Advancement of Science & Art in New York and the University of Kentucky.

He has practised professionally in England and the United States and has been a guest lecturer or visiting critic at several schools including Cornell, Yale, Texas, Miami, Rice, Syracuse and Penn State. He has written in international journals on the history of the modern movement in architecture.

Consensus among faculty to bring about changes is a key to rejuvenation at the school, Eardley believes. He does not want to play the "benevolent tyrant."

"I'm not here *necessarily* to change the school. If any changes are made I hope to participate in them as a member of the faculty, as its chief executive officer."

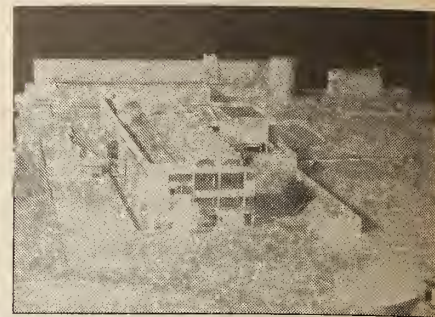
However, there are improvements Eardley would like to see soon. One is the return of the school's master's degree program, which was discontinued last year. He would also like to excite more interest in the landscape architecture program to better compete with the program offered at the University of Guelph.

Funding was a problem for the faculty of architecture, which spent approximately \$120,000 more than it was allocated over the past two years. He hopes he can stick to his budget, although he suspects it won't meet the need.

U of T is not unique in having problems with its school of architecture, he says. "The contemporary university is faced with the need to demonstrate productivity in various ways: its prowess in hard science, its capacity to attract research grants and contracts, and its prestige in terms of the number of faculty members recognized as scholars through their work in refereed journals."

"All of these things militate to one degree or another against the existence of architecture schools on university campuses. In addition, our studio education is extremely expensive. Architecture is probably one of the most expensive forms of undergraduate education available on any campus."

Architecture schools have gone through a period of unrest since the



Eardley's feasibility study for a new school of architecture at the University of Kentucky.

early 1970s when modernists clashed with postmodernists. It was recognized that modernism — commonly symbolized by rows of concrete-slab highrises — lacked humanity and richness. However, postmodernism, with its ornamental style (the new Metropolitan Police headquarters on College and Bay Sts. is an example), was also seen as "shallow," Eardley says.

Four or five new "isms" could replace postmodernism, "but they are also likely to be faddish," Eardley is no follower of a particular modern style.

"Styles are a lie. I have never been attracted to whatever it is that gets in the architectural journals, which publish things to sell the journals and, therefore, tend to foster cleverness and somewhat spurious inventions."

"I am attracted to those things that don't necessarily get in the journals... where the architect simply tries to do a good job in a given situation, with the client he is stuck with and with the budget he has got."

Seeing Toronto

Art, as defined by Montesquieu and as seen by Eardley, is "something that at first causes faint surprise, but a surprise that endures, grows and finally leaves the observer in a state of astonished admiration." That is how he likes architecture, too. He finds inspiration in the solidity and robustness of a craftsman's work; he likes "the peasant's directness of doing things."

His favourite architect is Le Corbusier, a Swiss-born Frenchman, who may also have thought that architecture should not "waste its time on futile efforts and pathetic little demonstrations of individual brilliance and quirkiness."

Not familiar enough with Toronto to be able to point out any eyesores or delights, Eardley has seen enough to be able to compare the city with an oriental rug. "The design as a whole is quite pretty. The park system is perfect, but the quality of the 1920s residential construction is disappointing — it has been done by a much less accomplished weaver."

He and his wife Una have purchased a house — "the prices here are insane" — on a street east of Upper Canada College. Tipped, it could fit into the hallway of their much larger home in Lexington. It has not been renovated and Eardley hopes it will give him an opportunity to do what he likes to do in his time off: build things.



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Wieland encourages imagination and play

She is architecture's artist-in-residence this year

THERE IS little magic left in architecture, says Joyce Wieland, the first artist-in-residence for more than 15 years at the School of Architecture & Landscape Architecture.

Art was once connected intimately to architecture but now architecture is dictated by developers and utilitarianism, Wieland said in a recent interview. There is one modern building in Toronto, however, that she likes: the golden Royal Bank tower at Front and Bay Sts. It has a "dreamy quality" and changes depending on the viewer's line of sight.

Wieland, 57, is known primarily as a painter but she has also worked with quilting, collages, film and other media. An officer of the Order of Canada, she has exhibited her work internationally.

She considers herself a member of the establishment in Canada, but in a playful way. Imagination and play are important, because they are spiritual and add meaning to life, she says. To get people to play and to be creative she would like to see an artist-in-residence not only in every college and school, but on every city block.

She and Canadian native architect Knobby Kubota also agree that the School of Architecture & Landscape Architecture should have a sweat lodge, a sort of sauna used by most North American Indian tribes in purification rites.

With or without a sweat lodge, Wieland hopes she can encourage and teach budding architects to use their eyes — to see more form and light — and to help imaginations grow.

Privilege

Four years ago, Joyce Wieland visited several U of T colleges and asked if they wanted an artist-in-residence. She quickly learned that artists are not staple staff members, but she did not forget her idea.

When she later met Professor Blanche Van Ginkel of the faculty of architecture they discussed it. This fall Wieland joined

the School of Architecture & Landscape Architecture for the one-year appointment.

Van Ginkel was instrumental in arranging the connection between the school and the artist, but the appointment was made by Dean Anthony Eardley, one of his first official duties.

There is no formal artist-in-residence program at the school, but Van Ginkel said it is "a privilege to have an artist of stature at the school of architecture." She compared Wieland's appointment to the writer-in-residence program at the colleges.

As artist-in-residence Wieland has no formal teaching obligations. She has a basement studio where students and faculty can drop in to discuss their art every Thursday afternoon.

Wieland has a habit of making her existence known. When the Art Gallery of Ontario in 1987 put on a show of her work it was the result of her calling on the gallery "to ask for my retrospective."

"Where will a woman be if she doesn't ask? I'd been a practising artist for 35 years. Men were getting retrospectives all over the place. Women are very far behind; they've got to go and do it."



Joyce Wieland

Engineering honours

FORMER University president James Ham and Professor Boris Stoicheff of the Department of Physics were among 16 engineering alumni of the Faculty of Applied Science & Engineering inducted into the Engineering Alumni Hall of Distinction Oct. 15.

They were selected for their accomplishments in design, research, invention, teaching, production, organization and administration.

Other inductees were Bohdan Hawrylyshyn, a management consultant; William Daniel, past president of Shell Canada; Donald Chisholm, founding president of Bell-Northern Research Ltd.; Harold Macklin, president of Marshall Macklin, Monaghan Ltd.; Robert Richardson, president, Bell Canada Enterprises; John Argo, past president, Gore and Storrie; John Bryce, a hydraulic engineer with Ontario Hydro; and James MacLaren, past president, James F. MacLaren Ltd.

Inducted posthumously were the

late Professor Mark Huggins who taught in the Department of Civil Engineering; Roderick Young, Ontario Hydro researcher in concrete construction; David Lloyd, a pioneer in both the propane and amateur radio fields; Robert McIntyre, an aeronautical engineer; and James Morris, the faculty's first graduate in 1881, a surveyor with the Ontario Department of Lands & Forests.

Three alumni received engineering awards. William Winegard, a former president of Guelph University, now the member of parliament for Guelph, and Donald Redfern, CEO of Proctor and Redfern Ltd., were given the Engineering Alumni Award, a biannual recognition of the career achievements of outstanding graduates. Frank Dottori, a 1963 graduate of chemical engineering, was presented with the mid-career award for his contribution to the revitalization of Tembec, a Quebec-based pulp producer.

Architecture's exhibitions

ALTHOUGH THE School of Architecture & Landscape Architecture is a small institution, it has one of the most active exhibition series anywhere, says Dean Anthony Eardley.

Professor Blanche Van Ginkel is responsible for the activity. Dean from 1977 to 1982, Van Ginkel has a small budget to arrange the exhibitions, but is able to attract a rich variety of shows to the school "by begging and borrowing," she said.

"It's a function we perform for Canadian architecture. As a university in the biggest city in Canada it is something we should do."

A travelling exhibition under the auspices of UNESCO opened Nov. 2. "Istanbul, Gateway to Splendour"

shows buildings from the Ottoman empire. Dr. Ahmet Ertug, who specializes in the study of Turkish architecture, has organized the show and will give a lecture at the school.

The last show this year runs from Nov. 22 to Dec. 15 and highlights the work of George Hargreaves, a San Francisco landscape architect.

Van Ginkel said she is particularly pleased with an exhibition mounted last fall. Showing the influence of French architect Le Corbusier on Canadian architects, it celebrated the centenary of the famous architect's birth. The show has travelled across the province and opened at the National Library in Ottawa last month.

We're losing autonomy: Pearce

THE UNIVERSITY is rapidly losing its autonomy, says Elizabeth Pearce, a member of the Business Board.

She and other board members agreed Oct. 31 that President George Connell should send a letter to the Ministry of Colleges & Universities to protest a new government policy on the sale of university lands.

First, funding was tied to enrolment; then research grants were targeted; now land sales require government approval, Pearce said. "That aspect terrifies me."

The Business Board objects in particular to one of the policy's four guidelines, which says that "universities and related institutions should notify the minister of their intention to sell or lease any of their lands. The ministry will then bring this information to the attention of other ministries that may wish to

acquire the land at market value to implement such initiatives as the Housing First Policy."

Connell said that while the new policy is not intolerable, "it is an example of the government extending its sphere of influence in the University." When the policy took effect Sept. 1, Connell wrote the ministry to express his surprise that it was implemented without consultation with the universities.

Janice Oliver, assistant vice-president (facilities and administrative systems), said it is unclear which lands are affected by the new guidelines.

The government policy is based on the principle that if lands bought with provincial assistance are sold, or if a mortgage is taken out on them, the proceeds be used to buy capital assets for educational and research purposes.

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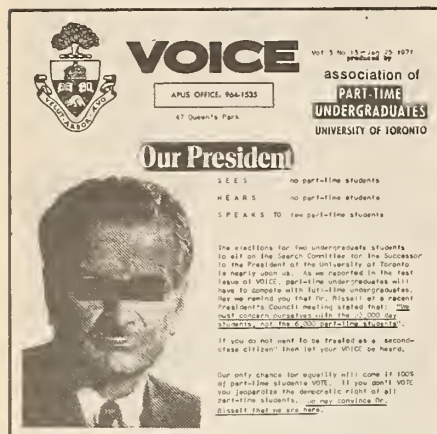
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APUS is 20 years old this month

by Karina Dahlin

IN 1971, three years after the Association of Part-time Undergraduate Students was formed, its newsletter *Voice* carried a picture of then President Claude Bissell, eyes covered with a black rectangle. The caricature showed him as



someone who sees no part-time students, hears no part-time students and speaks to few part-time students. Times have changed. This month

APUS celebrates its 20th anniversary and does so knowing that part-time students are no longer the outsiders they used to be. Thirty percent, or some 13,000 of U of T's undergraduate population, study part-time. They have two seats on Governing Council and are represented on just about every University committee of importance.

But they still have concerns. In response to *Renewal 1987*, President George Connell's discussion paper on the nature and role of the University, APUS said it found nothing in the document that recognizes "multiple careers, alternating between full-time jobs and periods of study, or our most cherished goal of lifelong learning."

"Very little thought has been offered in *Renewal 1987* as to where part-time undergraduates fit in the future make-up of the University."

Terry Johnston, APUS liaison officer, said part-time studies represent the future of education. "It is becoming less something you do only between the ages of four and 21."

The history of part-time students — or extension students as they were once known — at U of T begins in 1890 with the inauguration of Saturday afternoon lectures, open to the public. In the 1920s and 30s courses were available on the radio. The number of part-time students rose quickly after the Second World War and they became a group to be reckoned with in the 1960s. For a while there was a clear distinction between mature part-time students whose classes were given at night and young full-time students who attended university during the day.

At a median age of 25 to 30 a typical part-time student today is still older than a full-time student, said Darlene Robinson, APUS executive officer. But the age gap is narrowing, in part because full-time students are finding it more difficult to cope with high living expenses in Toronto and a full course load.

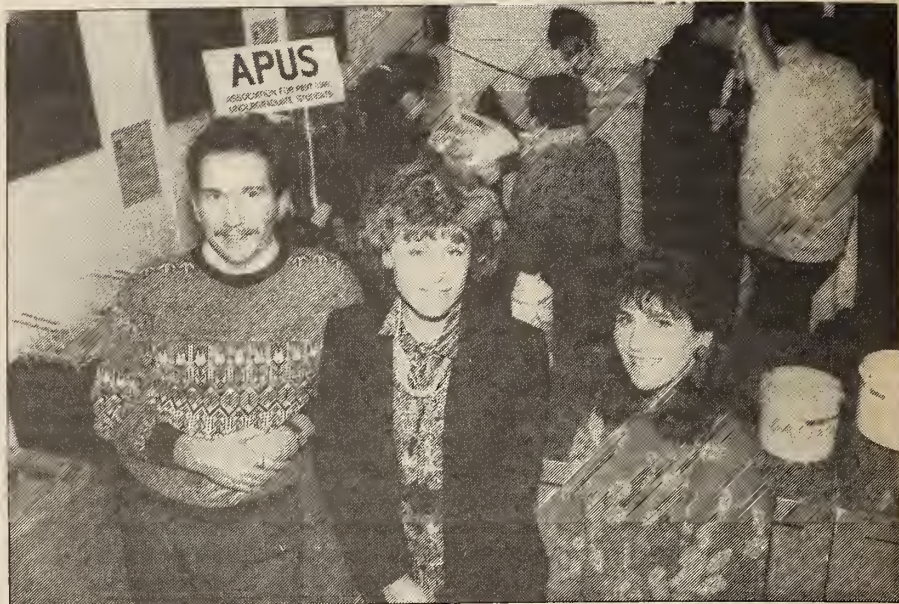
APUS's birthday is Nov. 24, the day the first executive was elected in 1968. However, the occasion will be celebrated Friday Nov. 18 with a formal reception at Hart House for the approximately 300 former APUS directors, executives and staff. A bigger party is planned for the 25th anniversary in 1993. "We don't want to outdo ourselves this time," Robinson said.

One of the speakers at the reception is Norma Grindal, a driving force in the creation of APUS. She and other part-time pioneers pushed for equality for mature students. Their accomplishments include the establishment in 1974 of Woodsworth College for part-time students who were not associated with other colleges, the introduction of remedial writing and math labs, and seats on University boards and committees for part-time undergraduates.

Much of APUS's time is spent finding practical solutions to its members' problems. Child care and better food services are current concerns. In 1986, the association managed to convince the administration that before the "drop date" of a course at least one piece of work must be returned with a mark to show the students how their performance compared with the rest of the class. A couple of years ago an arrangement was made with the Sigmund Samuel Library allowing students to return books on short-term loans 24 hours a day, not before 9 a.m. as had been the rule before.

The recognition of the half time program in law two years ago was considered a breakthrough. Other professional schools had already enrolled part-time students but at the law school the idea was met with resistance, said Robinson. "They said you had to be totally immersed to think as a lawyer."

Space was made for five part-time



Terry Johnston, liaison officer; Darlene Robinson, executive director; and Angela Di Fonzo, administrative officer, in their busy APUS office.

students, who must take the first year as a full-time student while the remaining two years can be done over a four-year period. However, no one has enrolled in the program as yet. "Perhaps the criteria for entry are too rigorous . . . you must prove why you cannot attend as a full-time student. But at least, it's a foot in the door," Johnston said.

At the top of APUS's wish list is the construction of an addition to Woodsworth College. The building has no lounge, cafeteria, auditorium or faculty offices. Close to \$1 million has been raised by a \$20 per session levy on part-time undergraduate students. However, the University has moved the Woodsworth project down on its own list of priorities, said Johnston.

The levy will be reviewed next spring. Both Johnston and Robinson hope the

fund raising will continue, "but we don't want to see students build it all out of their own pockets."

A new building will not alleviate the association's space problem. Located in cramped quarters in room 1089 at Sidney Smith Hall, APUS will not move to Woodsworth College; it is important to show members that their association represents part-time undergraduate students at all colleges.

With a staff of six — three full-time and three part-time — APUS has one photocopier, one telephone (which can be used free of charge) and three coffee urns to serve the hundreds of students who crowd the front office. The association has argued for more space for years. If it is successful, it will be just another milestone for an organization that never has to ask why it exists.

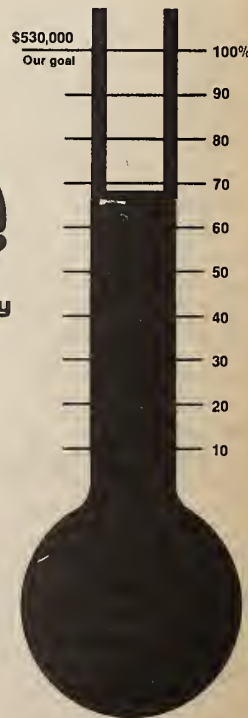
United Way goal: not there yet

THERE IS still time to enter the United Way draw for two return tickets to Rome. Officially the four-week fundraising campaign ended Oct. 21, but donations and pledges continue, says campaign coordinator David Jeu.

Those who contribute through payroll deduction receive three lottery tickets, those who give a cheque or a money order receive one. Other prizes include return airfare to New York City and Florida, a gas barbecue and weekends for two at downtown Toronto hotels.

The University's 1988 United Way goal is \$530,000. Sixty-eight percent, or \$360,000, has been raised to date. Last year the University raised \$485,000, well above its goal of \$450,000. Almost one-third of the money raised by the United Way is spent on services to individuals and families. Community/recreation and neighbourhood centres receive 21.4 percent, while 9.3 percent is allocated to services for the elderly.

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Operational Review of the Ontario Centre for Large Scale Computation

by

John J. Leppik • Peter A. Gregory • Peter C. Patton
Summer, 1988

1

The Assignment and Observations

The terms of reference for the study called for an independent operations review of the Ontario Centre for Large Scale Computation (OCLSC). The review was to include, but not be limited to:

- Strategic business plan for 1988-1995
- Organizational structure
- Marketing plan including pricing and client survey
- Support services
- Ease of access.

As independent consultants we have had the rare opportunity of having the freedom and luxury of surveying the situation and then being free to decide without any prior commitments or obligations which direction to recommend for the future.

We understood the goals of the OCLSC to be:

PRIMARY GOAL: Provide supercomputer services to the university research community in Ontario.

SECONDARY GOAL: Provide supercomputer services to industry, business and government to provide income for self-sufficiency on a fully-costed basis.

ADDITIONAL OPPORTUNITY: Foster cooperation with industry and business.

Our major sources of input were meetings with the Steering Committee of the Management Board, the staff of the Centre, the Inter-University Supercomputer Advisory Board and over 50 interviews with prominent users, commercial users, Government of Ontario officials, University of Toronto officials, Chairmen of the Users' Groups, individuals who had spoken out on the Centre and people with specialized technical knowledge. Many people took the trouble to write us and to produce special reports in response to our needs. We would like to thank the many people who generously helped us with their time, knowledge and experience. In the process we collected about 8" of documentation and that much again of related reports.

Everyone kept taking us back into the

history of the OCLSC and we went along on the premise that if we were to understand the present and influence the future, then we would have to understand at least some of the past. However, in this report we will not revisit the past. There is little point in proving that a supercomputer selected in 1985 and installed in 1986 was a correct or incorrect decision.

There are some in the university community who think that the Centre should not have been established at all. Others are convinced that the wrong equipment was selected. Still others are upset that proper procedures were not followed. It was not our task to assess the validity of these positions. Even if the past could be resolved to everyone's satisfaction, this would do very little towards settling issues that need resolution now and in the future. We started with the fact that the Centre has been operational for a year and a half. We should be able to learn from this experience and make some suggestions on how to build a better future. We found no substance in the occasional argument that there should be no future for the Centre. We also did not pursue those arguments which seemed to use the Centre for making quite unrelated points.

An observation important for understanding the issues is that all of the users of the CRAY X-MP/22 can be divided into two groups for management purposes:

The first group can use any amount of time on any speed and size of computer. They will never find a computer that is super enough! Current academic research granting schemes provide them with funds that are totally inadequate for paying any realistic price for their computer time.

The second group has needs with limits. Most of them could do their work on any large computer and thus they have alternate choices. A supercomputer makes some things easier, faster and with a favourable charging algorithm, cheaper.

In the body of this report we will refer to the first group as Type A users and the second group as Type B users.

There is no universal definition of what a supercomputer is. They are specialized machines built to solve

specialized problems. They are not the cheapest way of doing computing today, but they will do what nothing else can do.

User friendliness is not necessarily the strong suit of supercomputers. The CRAY X-MP has the most to offer in accessibility, usability and availability of application programs. It does not always win in one dimensional comparisons selected by detractors and there are many applications which can be done more effectively and more cheaply on lesser or different hardware.

We feel that the rate at which the load on this system has grown does validate the decision to establish a supercomputer facility in Ontario. The initiative did not come so late that the facility was immediately saturated and not so early that it was not adequately used. It has made it possible for Ontario to develop in this area of academic and industrial activity as rapidly as our people and organizations are capable of proceeding.

We feel that the level of usage has been somewhat understated as a per cent of full capacity, but even then, the number of registered users, the number of jobs and the number of billable hours have each more than doubled in the past twelve months. In fact, in recent months the load seems to have quadrupled. The present level of useful work delivered by the system is sixteen hours a day for five days a week. This is high utilization for many kinds of facilities. In the case of computer systems there is more capacity left for work which can tolerate greater than one day and less than seven day turnaround. Such capacity is often difficult to sell or utilize.

In doing our work, we developed a strong sense that our economy in Ontario and our institutions are not as advanced as we like to think. We have delved through the growth pains of the first Supercomputer Centre in Ontario. The problems that we encountered do not relate so much to the choice of computer, quality of operation, or adequacy of funding as they do to the immaturity of the environment. Debates as to whether the Centre should have been established have persisted. We have seen an inability to achieve significant inter-university cooperation even when there are substantial benefits to be gained. The difficulties that the Centre has encountered attest to the validity of the needs perceived by the

Government of Ontario in the establishment of the OCLSC. The problems of this Centre in 1986 and '87 have been very similar to comparable centres in the USA in 1983.

There is no way of assuring that past controversy will not continue, but we have never seen a situation in which so much havoc has been wrought by so few with so few tangible issues which concern the Centre itself. We hope that our work will contribute to bringing the situation back towards normal.

We feel it is important to note that many users did stop to observe that the establishment of the Centre was a very significant and courageous initiative on the part of the Province of Ontario and the University of Toronto and wanted to express gratitude to the Province for the opportunity that has been created for them to pursue research on an equal footing with their colleagues throughout the world. We think that this is an opportunity to build an ongoing centre in which the latest in computational science and technology can be practiced.

We found the operation of the Centre to be significantly better than we had been led to expect. Nevertheless we observed the following:

Financial viability. Because of well publicized shortfalls in revenues, Ontario has contributed another \$8M for the next four years of operations. This still leaves an operating deficit, no funds for rejuvenating the Centre's aging though not yet old computer, and dependence on sources of income that have yet to be demonstrated.

The Centre is not perceived to be successful. This is largely because of lower than projected utilization, limited configuration, limited communications facilities and an endless furor about past decisions.

The memory of the CRAY is small and limiting. If the Centre is to continue to provide access to leading edge systems it will need to be augmented and the current equipment replaced before 1995.

The Centre has not developed an adequate process for decision making and issue resolution.

Marketing, both internal and external can be improved.

There is a need for renewed and expanded outreach programs to other universities which includes improved telecommunications.

There is a need for better and more available information on operations. This includes accounting, loading, performance, pricing and modelling of operating characteristics.

The Centre's self image was too CRAY and Toronto oriented. It needs to expand to Ontario and Canada and to a concept of large scale computing services which can be continued when the CRAY has been displaced.

The principle of equal access to all users of a Provincial facility needs to be extended to include communications costs.

For users who need time for research but cannot locate sufficient funding, there is considerable aggravation that spare time on the system is wasted.

The people who have gotten through to the system communicate a consistent level of satisfaction that the support staff is knowledgeable, helpful and effective. With an impressive frequency, users have gone out of their way to make positive comments on the support received.

Perhaps the biggest problem we encountered was that just about everyone saw the situation as being boxed in with little or no maneuvering space. Having identified problems which required resource to fix them, we had to and did find some options which can give the Centre the necessary flexibility to prioritize and plan corrective action.

2

Summary of Recommendations

• In our view the problems of the business plan outweigh expenditure on the needed memory and storage upgrades. The memory upgrade will be required in the first quarter of 1989 to support the planned changeover to a new operating system. The SSD storage is also needed but is less critical.

• To resolve the problems of the business plan we recommend that three months be taken to pursue the following:

Reach agreement with one industrial partner.

Enlist researchers who have benefitted from the Centre and the University community to support this effort. Seek a higher level of commitment from Federal funding agencies to the need for an ongoing supercomputing facility that can continue to provide a variety of advanced computing systems.

The University and the Province should seek Federal support for this facility, offering the infrastructure and investment that has been created as a basis for an ongoing national facility.

At the outcome of the 3 month effort the options for the business plan will be clearer. This is the time to decide on the hardware upgrade.

• The Centre and its governance structure need to be modified so that they can more effectively resolve issues, select futures and make decisions. The OCLSC should see the Advisory Board

as its preeminent client.

• The Centre needs to establish a more effective outreach program to all Ontario universities. This will require representatives and staff located on other campuses. It will also require financial resources and communications facilities that are not in the current operating plan.

• Improved communications facilities are a necessity not only for access to the Centre but for other academic applications such as libraries. This need should be addressed at the Provincial level.

• The Block Service plan is an effective means for meeting some of the needs of Type A users. Other users, who require less time but more support, can and should pay at higher rates. We suggest a way be found to make unused time available to Type A users since computer time is instantly perishable.

• It is important that the planned new space for the OCLSC be prepared and occupied as soon as possible. The present space and interim arrangements are inadequate and a deterrent to satisfactory operation.

• A more assertive public relations effort must be undertaken by the Centre. The success already achieved will garner further success. New technologies are established by leaders and super-computing is best promoted by publicizing the research successes of major users.

• The Centre should operate with full openness and ample data availability. The only confidences that need to be kept are client data security and details on commercial clientele. Only total monthly and annual commercial sales should be reported.

• Since most jobs are short, it would be better to express the charges in terms of minutes. Thus the present nominal rate of \$100 would become \$1.67 per minute and 85% of the jobs processed would cost \$2.00 or less.

3

The OCLSC Business Plan
Thoughts on Projections to 1995

The outlook on technology is covered in Section 7. A clear conclusion that can be drawn from this outlook is that the present CRAY computer at the OCLSC will have to first be augmented and then replaced by 1995. Such moves will require funding that cannot be generated from operations as presently planned. As we cannot suggest a plan which would provide for rejuvenation from operating revenues, we have proposed a marketing/management plan which will seek out achievements and successes and communicate them to relevant constituencies. Our thinking is that the successes will be usable in constructing bids for rejuvenation funding. Thus it will be the users who will provide the main justification for future upgrades.

To make this work, the Centre also has to play a key role. It has to fulfill its role as a supercomputing centre serving the academic and industrial communities in Ontario and beyond with strong user support. To achieve ongoing vitality it has to find a way of offering capabilities

which users cannot obtain otherwise. The technology of the X-MP will become increasingly dated because of its processor speed, limited memory size, limited ability to explore multiprocessing, high maintenance cost, and the low price at which increasingly competitive capabilities can be obtained.

The planned memory expansion will extend the useful life of the current system. The addition of Solid State Disc (SSD) memory will compensate for the limited main memory that can be added to this particular system, and will be necessary at some stage. Cray has recently changed the architecture of its X-MP series again, and introduced features that will not be available to the University. The new prices for main memory and SSD should be compared to those quoted to the Centre, and the delay in ordering has enabled this comparison to be made.

It would seem appropriate to introduce massively parallel technology around 1990 and to plan the replacement of the CRAY with a current fast scalar/vector system, which will include limited parallelism, around 1992. We believe that massively parallel systems will provide very high speed computing for an increasingly wide range of algorithms, especially for work that is not oriented to floating point arithmetic. As an example, the Canadian developed Myrias system should be evaluated. The scalability of this technology allows a 64 processor system to be obtained for well under \$1M and then expanded over time. The very high proportion of programs that appear to be developed locally would suggest that parallel technology will be easier to implement in the University environment than it is in commercial installations where the problem of code conversion is more marked.

Several developments will be visible by 1990, and should be evaluated against the spectrum of needs of the user community. These will include:

Very fast scalar systems implemented in both GaAs and silicon.

The 1990 Japanese systems that result from the seven year initiative by the Japanese Government.

The CRAY 3, with its 2ns clock and 16 processors.

The range of performance indicated in Table 7-2.

It will be important to develop procedures during the intervening period that establish the balance between maximum speed computing and cheap computing. Researchers in some fields will always need access to the enabling capacity of supercomputers but it may also be necessary to divorce funding for these unique facilities from the needs of less demanding users. Alternatively, the demand for peak speed may need to be compromised in favour of lower, but more economical performance.

Centre expenditure should include the provision of facilities that effectively support supercomputers. This will include storage systems on a network and advanced graphics devices.

The 1988-1991 Financial Plan
As the CRAY has now been operational for a year and a half at very attractive rates, it is reasonable to conclude that most people with a need have made some arrangements to use the

supercomputer. Thus the establishment of the OCLSC has in fact satisfied the latent need for supercomputing in Ontario and additional capacity remains to encourage and handle additional ways of using supercomputing in academic and industrial activity.

We feel that this situation does in fact validate the decision to establish the facility which has greatly increased the computational capacity within this province. It has made it possible for us to develop in this area of academic and industrial activity as rapidly as our people are capable of proceeding.

Why has usage not grown faster on the CRAY? In a tight funding environment, it appears reasonable to assume that most of the cost sensitive and computationally intense work at the University of Toronto has migrated to the CRAY. This seems to be the case although there appears to have been relatively little migration of this kind.

It is possible that lack of information, unfamiliarity, inconvenience and jurisdictional considerations have inhibited full migration of the same work load from other universities. Since six universities have not yet used the CRAY it is reasonable that this may be the case. Recent growth and usage indicates that time may be the major factor in developing productive applications.

The current operating plan is perhaps best thought of as a framework within which some quite well known problems must be solved. These are:

How to state publicly that the plan does not work in future years without additional expenditures and funding. Neither aspect can be sized now or resolved now because the solutions depend on future events.

The plan is dependent on revenues that seem ambitious when compared to past achievements.

Operating costs appear to be at an irreducible minimum.

An important factor in the financial plan is its dependence on the following major revenue from uncommitted sources:

YEAR ending	4/88	4/89	4/90	4/91
Contract research	0	850	1350	1600
Commercial sales	550	750	1000	1250
Total	550	160	2350	2850
with university research funded work of				
	275	494	650	800
out of a total operating cost of				
	3917	6854	4584	4432
leaving the following percentage to be proven from the uncommitted sources.				
	14%	24%	51%	63%
with research funds and MRC/NSERC providing				
	7%	7%	14%	18%

The vulnerability of the operating plan to unproven commercial sales is considerable, and the lack of coverage from research funding is very striking. It is exposed by the concept of industrial partnerships not being proven and by the variability of external demand. It is our opinion that the sale of "machine cycles" is difficult to accomplish. The strategy already identified by the Centre for partnerships and "crisis time" should be the focus of marketing for external, non-government funding.

We have recommended an urgent initiative to establish the basis for the business plan during the next 3 months. This work should consider three plans:

A plan for a flourishing supercomputer centre. It would provide for rejuvenation and growth. It would identify when and why new funds were needed. It would define the goal to shoot for.

The second plan would be the present plan plus a line item for a revenue gap (or surplus) for future years.

A plan for shutting down should this become necessary. This will probably not be as precipitous as one might think. The equipment is purchased, the installation is paid for and there is an established clientele. If there is no future to consider, operating costs can probably be trimmed by more than a million per year. There will probably be enough time to negotiate a reasonable sale of the equipment, or preferably to find a rescuer.

Many of the line items in the plan will be commented on more fully in the following sections. In general we find the expense lines reasonable and appropriate. The revenue lines seem very ambitious because revenues to date are only a small fraction of the original plan, the market for computing cycles is extremely difficult to forecast, and there exist major dependencies on partnerships with industry. The revenue expectations for future years are still almost equal to the original plan. It is our view that partnerships that are based on research relationships as well as computer time have a greater chance of success and should be pursued as well as the sale of CRAY time.

It is difficult to understand the almost total lack of Federal funding for this unique facility in Canada. We think the most untapped source of potential OCLSC funding is the Federal Government research support agencies. Of these, NSERC is the most directly relevant but the others should not be overlooked.

As we understand the mission of the Natural Sciences and Engineering Research Council (NSERC) it is to assure that there is an adequate infrastructure for science and engineering in Canada. NSERC does not have an exclusive on this concern but it does spend close to \$300M a year towards this goal from which it has made \$194,000 available in special grants for the purchase of computing time from this Centre. That represents about .07% of the NSERC operating budget. There is however further NSERC support which we cannot size. Last year, NSERC granted \$143M in operating funds which can be used at the researcher's discretion and this includes the possible purchase of supercomputer time.

There are, of course, many needs. One observer pointed out that to get into the space program or to get nuclear submarines the bill is \$1,000M plus or minus a factor of 2. To provide atom smashers and reactors the bill is \$100M plus or minus a factor of 2. These are relatively narrow and specialized areas of technology. To provide a supercomputing centre the bill is \$10M plus or minus a factor of 2. Supercomputing is a scientific and engineering tool at the cutting edge of technology that can, for example, be compared to the provision of a wind tunnel or a telescope, and it is a very widely enabling technology which can be used in many disciplines.

There were many suggestions ventured as to why NSERC did not support this facility more appropriately. Most of them referred to a well respected process that arbitrates established needs. It is a process that has not yet recognized the merits of supercomputers. NSERC supports theoretical science and experimental science. It is time to recognize computational science.

4

Marketing and Sales Plans

There is no realistic prospect for the OCLSC becoming a commercially successful supercomputer service bureau. We draw this conclusion based on the following:

A number of recent commercial propositions have not proceeded.

The Centre's own marketing efforts have demonstrated how thin the Canadian industrial market for technical computing services really is.

If and when sufficient volume does develop, then there will be aggressive, world-wide competition for that business. This will be led by the manufacturers of supercomputers.

The Centre is not financed, staffed or chartered to make a major commercial thrust.

There is nevertheless a commercial role for the Centre that relates to its key objectives. It can play a vital role in introducing Ontario and Canadian industry to the benefits of supercomputers and in the process generate some needed operating revenue.

A sales plan must recognize that the product being offered is unique in this part of the world, has some very clear attractions and also some very clear inhibitors. The outlined marketing program should locate those with even a passing fancy and then make it fairly easy for them to achieve productive use.

Whether there be a marketing manager or not, marketing of services in a consortial academic service centre is a shared responsibility. It is important that management and user committee members understand that they not only represent their colleagues to the Centre but that they also represent the Centre to their colleagues and wider communities.

It is important that the Centre have a strong outreach program, particularly during its start-up years. The OCLSC has already done a good job in this regard, especially considering it is not generously staffed. Unfortunately, the controversial, confrontative atmosphere which the Centre has encountered during the past year has handicapped both internal and external marketing and public relations efforts. This situation will turn around as soon as the Centre is seen to be successful.

Academic Marketing

Solution of the academic marketing problem depends on the resolution of two viewpoints. The Centre wishes to serve its users well and recover its operating costs in doing so. The user wishes a friendly, convenient effective service at the lowest possible cost. The

first aims of both are easily resolved by the usual academic consensual decision process, the second are virtually never fully resolved. The best one can hope for is to come up with a computer services pricing strategy that collects all of the money on participant campuses that is reasonably available for the class of computing services offered by the OCLSC. Once this is done, and its operating costs are still not being met, then the resulting deficit issue must be solved at a higher level. The approach recommended for commercial marketing is equally applicable to reaching the academic clientele.

Commercial Marketing

The commercial marketing problem is less complex but more difficult to solve. Almost every academic supercomputer centre in the western world is expected to recover part of its operating costs by selling time to commercial users. Their success is limited for a number of reasons:

There is not a large commercial market for raw supercomputer cycles and it is difficult to find.

Universities are not staffed to provide value added human support services like Cybernet or Boeing Computer Services.

Industrial users have no experience buying services from academia.

Industrial users do not have sufficient trained staff able to use existing supercomputer application codes.

Industrial users have almost no staff experienced in writing new super-computer application code.

There is something that industry does want from academia; and a supercomputer centre, microelectronics centre, or bioengineering research centre is well positioned to satisfy that need. What industry wants and needs from academia is early access to new technology and improved technology transfer from basic research through applied research into advanced product development. Since the last dominoes to fall in this long string are economic development and new jobs, federal and provincial governments are often willing to help set the research university up in such an enterprise. Formerly technology transfer was in the form of monographs, journal articles, research reports and patents. Today it more often is in the form of a computer model or piece of software. The best vehicle for technology transfer has always been the contents of the human cranium and technology transfer has always been favoured by physical contiguity, or at least proximity. The technology that is transferred is not only the physical understanding of a complex problem, but also the numerical implementation in a computer model and the optimization skills for supercomputers.

Thus the supercomputer as a creator or generator of information is an ideal forum for academic, government and industrial research interaction. The best way to get this activity started is by an industrial affiliates program such as the one Minnesota pioneered with the CRAY 1 in 1982/83 or, even better, like the current program at the University of Illinois. Cornell has a similar but less ambitious program.

The program underway at the OCLSC is well conceived and has targeted some excellent prospective affiliates. The

marketing manager has been handling this but a quarterback cannot win the game alone. At critical times he needs to be able to call in the vice-presidents of research and business administration, the president of the university, occasionally a well known professor and perhaps even a deputy minister. Some of this has been done but more can be done. Experience in setting up such programs has shown that the first affiliate is the most difficult to sign. After that they become successively easier. As the program grows other universities in Canada can undertake similar programs serving other companies since no affiliates program is large enough to include industrial competitors.

A lesser version of this program would also be appropriate. The establishment of birds-of-a-feather groups for selected markets would seem to have potentially high returns for modest investments. This is covered further under Product Development.

Very broad coverage of potential clients could be achieved by the publication of user successes. The Centre has already done some preliminary work on this. The idea is to use a marketing promotion firm to supply experienced co-authoring and production facilities to prepare success stories on CRAY usage and to get them published in relevant industry and academic publications.

When this program is first started, preprints of these articles to a selected mailing list could also produce good results. Once there is enough material in the pipeline, reprints will be more effective.

The Canadian Market

The market for CRAY time has proven to be very thin. The Centre has the resource to follow real leads but it has difficulty finding enough leads to follow. We suggest the following:

Identify those areas in industry that have been well penetrated by CRAY computing in the US. Then identify work that is going on in that area at the UofT and publish some success stories in the trade press.

Then follow through with sales activity and support for those who have come forward.

The Centre has initiated the pursuit of defence contractors who have a need to satisfy Canadian offset requirements. This looks like a most promising new market for the Centre.

We did not find a marketing or sales plan to review. There was a long dissertation on the nature of the market, what had been done and what could be done that was quite useful. At our suggestions the Centre has developed a month by month and customer by customer sales plan for the next year.

Pricing of Services

The supercomputer centre is both a facility for applying computational methods to large scale problems, and with current pricing it is also a source of inexpensive computing. The presentations to the review group have made it clear that limited financial resources make artificial pricing of the facility unavoidable. We propose the following principles for allocating time: That charging be based on scarcity, with higher billing rates for interactive and fast turnaround requirements. Lower rates should be applied to work requiring only next morning or next Monday completion.

Some way should be found to make unused time available to those who can use it without jeopardizing the financial viability of the Centre.

Charges for front-end time, which is an unavoidable overhead to the CRAY, should be minimized.

Free or low cost introductory usage should be made widely available to allow new users to learn the CRAY and to port programs without penalization. We propose that enough time be allowed to achieve productive use or 2 hours of usage, whichever occurs first.

Charging and the provision of service in a province-wide facility should be based on the principle that location within the province does not penalize the user.

The pricing of services is probably the most difficult set of issues for the Centre to resolve. It is probably no easier than finding a solution to the problem of feeding the hungry. The Centre has made good progress here and has established a working base. Our recommendations are mainly refinements.

In the pricing debate there is the position that the establishment of the Centre used money which could have been allocated to departmental centres and the operation of the supercomputer centre at low rates diverts revenue from departmental centres so there is a double whammy. Thirdly these centres have suffered from users migrating to personal computers at the bottom end.

On the other hand there is the position that prohibiting access to unused time is criminal. Since the time is already paid for, why not give it to anybody who has use for it because computer time perishes instantaneously. This approach has been taken by some computing facilities, consequently there are people who scour the world for free time, they are very mobile and go where the time is — temporarily.

One orientation that this argument comes from is that very much more expensive pieces of equipment such as reactors, linear accelerators and large telescopes are available free. But we think there is an important difference. A large telescope can only be used by astronomers for search and research. A supercomputing facility on the other hand has no direct utility whatsoever. Nobody does computing for computing's sake. Computing is used to do other things and computing is often only an alternative way of doing other things. Thus a supercomputer is a tool with very general utility and one that can be consumed totally by a single user.

This situation occurs in other aspects of the computer industry. It is a case of over supply in a business in which the up front investment is large both in dollars and time, and the incremental unit delivered cost is almost zero and the opportunity or commodity perishes very rapidly. With multiple suppliers this results in savage price wars.

We think that because of the nature of the facility and the way it was established the intent was to have a world class facility for Type A users. Thus every effort should be made to allocate as much availability to this group as practicable. A suggestion is that idle time be made available to Type A users in direct proportion to the amount of paid time they have used in the past 30 days.

A Type A user should be qualified by a peer review process. We think a good starting point would be the requirement for a credible plan to use more than 100 hours of computer time. With present bulk service rate agreements this means anyone spending more than \$4,500.

This leaves the Type B users. They are characterized by their work being feasible on alternate computing resources. They are attracted to the Centre by better price, availability, turnaround, etc. We think the rate for this group should be increased so as not to impact the economies of competing centres too greatly and so as not to consume too large a percentage of the system and so as to contribute to the operating budget of the Centre. Increases should be announced in sufficient time for users to account for them in their budgetary process.

The Type B user needs no qualification; only money. The average research professor is funded in a range of \$20,000 to \$70,000 per year. We believe that like managers elsewhere, they can reallocate up to 10% of their budgets to acquire a resource that is important to them. This would give them \$2,000 to \$7,000 a year to allocate to computer time purchases. This amount will buy them very substantial CRAY time even with significantly increased rates. From our review it is clear that research professors can and do allocate such amounts to computing routinely.

Since the large majority of jobs are relatively short we think it would be better to express the cost of the system in terms of minutes. \$1.67 per minute is much more indicative of the cost faced by a university user than \$100 an hour. The bill for 85% of all academic jobs submitted is less than \$2.

There should be provision for two types of pricing for SSD use. In one situation the user is getting the benefit of a very high speed auxiliary storage device which shortens his problem solution time. In the other situation the device is used to augment limited primary memory and thus this option considerably lengthens his problem solution time.

User Survey

The generalized user survey was done by sending a single questionnaire to 100 users and 100 potential users. The 100 users were selected from the OCLSC list of over 200. Every second user on the list was sent a questionnaire with care taken to assure that the top 25 users were included.

It was more difficult to locate and identify potential users. Initially we thought that the largest users at the University of Toronto Computing Services (UTCS) would be the best source of potential users. This turned out not to be so because most users at the UTCS use specific applications that are not available on the CRAY. A further check indicated that there had been very little migration from the UTCS and eight departmental computing facilities at the University of Toronto. A possible conclusion is that most of the computing done on the CRAY is new computing work that was not getting done before. We decided that the best available source of potential users was the OCLSC's mailing list for its newsletter. This represented individuals who had expressed some interest to be on the mailing list. Every fifth name that did not also appear on the user's list was selected.

Out of a total of 200 questionnaires we received 59 responses, or nearly 30%. They included 51 who currently use the OCLSC, and 3 who plan to shortly. Of the 51 users 19, or 37%, were not from the University of Toronto campus.

The survey covered users from a wide range of disciplines. They were chosen randomly and included 49% from the Natural sciences, 27% from Engineering sciences, 10% each from Life and Mathematical sciences, 1 Social scientist, and 1 representative of user services.

CRAY supercomputers are optimized for certain kinds of computation, and are not necessarily cost effective for calculations that do not need their extreme speed; in our interviews the impact of CRAY time on thin user budgets was also repeatedly stressed. In order to explore these issues, we asked whether the CRAY is essential to the work of respondents, or whether more limited facilities would be acceptable if the cost were lower. 26 out of 54 respondents stated that the CRAY is "essential".

The issue of the CRAY configuration was explored by asking whether the memory of the CRAY was adequate, and whether it seriously limited the use of the system today. The responses were that 26% of respondents are prevented from making substantial use of the CRAY because of limited memory, that all of these were affected by limited main memory, and half by the limited SSD memory. This result does not show up in usage statistics.

In relation to application development, 18 out of 46, or 39%, had developed their own applications on the CRAY, with the remainder developing them on other equipment. The responses give the impression that a high majority of users are using their own developed software, rather than third party applications, or programs developed at other universities.

Question 7 explored the level of usage that is probable or possible for each year up to 1991. From past experience these figures should not be used as a forecast of actual load, but do indicate the distribution of use. It was clear from interviews that many researchers have problems for which they could use time that they cannot afford; in our survey, we found 6 users who, between 4/88-3/89, expect to use over 100 hours, with the largest at 400 hours; the remainder expect to use several tens of hours. The concern over NSERC funding makes it difficult for the respondents to forecast actual usage, and makes it even less easy to forecast the demand in later years.

We asked about communications facilities, and although a high number of respondents indicated that they were satisfied with their ability to communicate with the Centre, several indicated that they faced significant problems with the communication of large files for input or output, and with graphic output. As these are often generic problems with the use of remote, high speed systems, we would expect stronger pressure on communications facilities than the numbers would indicate. There is also the concern, not measured, that the respondents were generally people who have learned to use the Centre, and not those who may be unable to.

A high proportion of users recorded their satisfaction with the Centre, and praised the analysts particularly. Areas of

dissatisfaction were very varied.

Six respondents were not planning to use the CRAY, and indicated that their reasons were budgetary, convenience when compared to more local facilities, and problems of porting their software to the CRAY configuration. One user indicated a cost of \$30K to port software to run on the CRAY. This is likely to arise from converting a program that runs in large virtual memory to the physical memory of the CRAY.

We also conducted in person and telephone interviews with commercial users of the system. Generally they were very enthusiastic about the local availability of a CRAY and saw major new possibilities opening up for them. Some of them are using the availability of the CRAY in their advertising. Our impression is that they do not fit neatly into either of our Type A or Type B categories because their jobs are generally substantial but not larger than available machines can handle.

Those who had used the system were very pleased with the help and support they had received from the Centre and a number made the point that the pay-as-you-use nature of the service was instrumental in making it possible for them to move to supercomputing. There was also considerable interest expressed in birds-of-a-feather user meetings at the University where people could meet to share problems, share solutions and meet some of the academic resources that are available at the University.

Product Development

An important feature of the CRAY is that it has a catalogue of over 600 applications that have been developed and more are being developed. We do not see the OCLSC getting involved in this kind of application or product development. There are, however, other "products" that could be developed to serve both academic and commercial clienteles.

A very effective and low cost way of identifying potential clients and serving their initial information needs would be to hold monthly meetings for people with common interests in specific applications. The main features would be a speaker on a related topic, the opportunity to discuss problems with other users and the opportunity to establish industrial/academic liaisons. This activity could also be supported by a specialized newsletter. We think this could become the basis of a very effective marketing program for machine time, consulting and partnerships.

Usage Growth

The rate of usage growth at the OCLSC is typical for supercomputer centres in a partial charge back environment. Naturally a no cost policy would allow usage to build up more rapidly, as it has done at the NSF funded centres in the US. These centres are now saturated with little chance for upgrading before 1989/90. The NSF is considering a market mechanism based pricing policy for partial user charge back to ameliorate current overdemand, stretch out the upgrade period, more equitably distribute the resource and encourage user's home institutions and funding agencies to share the cost of supercomputing.

At the University of Minnesota during the period after installation of a used CRAY-1A in December 1981, the usage buildup pattern reflects a full user charge back experience. Academic users were

paying \$650 per hour for Cyber time in a centralized facility. The CRAY ran ten times faster for an initial charge of \$2124 and absorbed the available demand.

Academic Year	Hours billed	Hourly rate
1981/82 (6 mos)	62	\$2124
1982/83	921	2124
1983/84	1528	972
1984/85	2917	972
1985/86	5194	972

The annual cost of operating the CRAY 1A on the margin of a very large computer centre was about \$2M, including debt service. Usage trailed off rapidly after installation of a CRAY 2 which became fully operational in mid-1986. Note that present OCLSC billable hours are comparable to the fourth year level at Minnesota.

Usage buildup at the five NSF centres in the U.S. was very rapid since users do not have to seek actual dollars for machine time, but rather apply to an allocations process. The usage buildup at the OCLSC over its short period of operation shows an experience intermediate between full charge back and zero charge back pricing. The current OCLSC rates are about where the NSF would like to be with a partial user charge back rates system.

The Centre has been reporting utilization on the basis of 15,000 CPU hours being deliverable per year. One processor operating 24 hours per day for a year would have an upper limit of 8,760 CPU hours. In general, a two processor system can only deliver 1.7 times the capacity of a single processor system and since this particular system has limited memory and storage, a factor of 1.5 is more appropriate. Not all CPU cycles can be accessed because of input and output. This further reduces capacity to 0.8 yielding $1.5 \times 0.8 \times 8,760 = 10,512$ CPU hours for the Centre's configuration. There is a further need to account for weekly preventive maintenance, occasional system failure, software maintenance and upgrades, on-line diagnostics and a variety of utility work. The system should be considered to be working at 100% capacity if it delivers 9,300 CPU hours.

Utilization should count only services rendered to clients and all services rendered to clients whether billed or not. Current reports do not quite produce this number, but something less.

Applying these criteria, April utilization would appear to be $(506 \times 12) / 9,300 \times 100\% = 65\%$.

Ease of Access for the Centre
Ease of access to the Centre is clearly a limiting factor in usage build-up. There appears to be a threshold situation which involves natural intimidation, accessibility, ease of use, availability of information, accounting algorithm, and time which must be overcome before someone becomes a user. For remote users there is the additional hurdle of effective people and systems communications.

It is possible to conclude that everyone who has had a real need to use the facilities offered by the OCLSC has managed to get through the inhibitors. OCLSC staff have visited Ontario campuses and most people have found the support staff very helpful. Nevertheless there is a need for a more

effective outreach program.

Considering the size of the Centre's staff, some significant efforts have been initiated. These have included the newsletter, personal visitations, documentation, video tapes and telecommunications facilities. These efforts have produced significant although somewhat spotty results.

Fifty per cent of the Centre's capacity has been targeted for use by Ontario universities. During an eight month period from September 1987 to April 1988 the total billable hours were approximately 1800. Of these 711 hours of machine time was used by Ontario universities other than Toronto. Specifically:

Guelph	307
Queens	157
McMaster	78
Waterloo	76
York	51
Western	40
Brock	2
Ryerson	0
Ottawa	0
Others	no registered users
	711

Unless there are no potential users in the outlying and small universities then clearly more needs to be done. Some of this will be covered under Improved Communication Capability but some tasks can only be done by people.

Perhaps the most cost effective solution would be to locate a using post-graduate student, or identify a support person at the local computing centre on each campus who would be responsible for helping potential users find an appropriate access path to the CRAY and for advising the Centre of the difficulties encountered by remote users. This person would be expected to provide information, assistance and mostly time which would be beyond that which could be provided by members of the Inter-University Supercomputer Advisory Board. This kind of activity has been started. We think it should be taken further.

Under space, we have recommended that the central staff not be too large and thus serious consideration should be given to locating some remotely. This should initially be tried on a temporary basis and with planning can probably be done at relatively low cost. We think that this would provide invaluable understanding of how remote users could be helped more effectively.

Users could benefit from monthly activity reports which list individual charged activities. This is necessary for them to understand what is going on, how they are charged and how to more effectively structure their solutions. The current reimplementation of the accounting routines will include this kind of feature. Some users should be consulted about its adequacy.

Communications bandwidth alone is not enough. The Centre should help any user, anywhere in the network by providing training through on-line help, telephone support, side by side training, and courses, and have a budget that reflects the cost of doing so. In limited cases it may be necessary to get a user started by having them work on the facilities at the Centre, especially in the field of graphics. Financial support to enable them to do so should be available as part of the concept of province-wide access.

Improved Communication Capability

Networking has been an area of uncertainty among Ontario universities for over twenty years. Many options have been explored and NetNorth is now operational. The Centre has augmented this with iNet services and some nearby universities in cooperation with the University of Toronto have run some high speed lines. The result is still considered inadequate by many remote users.

When one considers the needs, available technology and costs, one has to wonder whether Ontario universities have reasons for not implementing effective networking. Certainly the needs go far beyond supercomputing and implementation is a task beyond the OCLSC. Demands are appearing from various sources and manifesting themselves in independent solutions. However it now appears that the floodwaters are breaking the dam. Six universities in the central core have come to a networking agreement, the Ontario government is developing plans that can help the universities and there may be a Federal initiative.

At this time we think that the OCLSC should be fully aware of their user requirements and represent them aggressively to the network builders. OCLSC should also keep its constituency aware of progress and plans. However there will still be shortfalls in networking facilities for some time. OCLSC should also allocate a larger part of its budget towards overcoming short term inadequacies and where necessary reducing or eliminating geographic differences. This is a complex area and care has to be taken to avoid long term commitments for substantial charges.

The OCLSC is neither constituted nor funded to solve the remote user telecommunication problem. We recommend that the MCU or the universities themselves develop and implement an inter-university telecommunications system for Ontario universities. While supercomputing may constitute the earliest major use of such a system, over the long run voice and interlibrary communications will naturally come to dominate the system.

5 Support Services Staff Requirements to Achieve Sales

The number of support staff is by no means large. Although users have a variety of concerns regarding the OCSLC, there appears to be a fairly consistent level of satisfaction that the support staff is knowledgeable, helpful and effective. With an impressive frequency, users have gone out of their way to make positive comments on the support received.

This group should be congratulated for the level of user satisfaction that they have achieved. They will have a significant challenge to maintain this through the upcoming conversion to the UNICOS operating system. This resource will be seriously stretched during the conversion. In our view, it is a quality group at the right size for this operation.

Current support staff is systems oriented. Most users will have conquered the CRAY by now so as an opportunity occurs for staff turnover there should be

an effort made to recruit application specific strength.

Additional Hardware

The present configuration is small for a CRAY X-MP. The proposed memory upgrade from 2 MegaWords (MW) to 4 MW and supporting storage upgrade from 16 MW to 64 MW would make the system a well rounded configuration in the CRAY world. Most of the Type A users are anxious for these upgrades but they will often tell you that even this is quite inadequate. This is so because they can always use a larger machine. We could not find any work which would quantify such needs in terms of future utilization and revenue or in terms of academic merit. The Centre has, however, kept meticulous statistics on past usage. We looked at this data for evidence that a significant number of users are presently using the system to capacity.

On memory utilization we found the following. Only 77 jobs out of 15,260 billable jobs have used all of the memory. They are relatively large in that they represent 15 out of 740 billable hours and amount to \$8,164 out of \$231,367. Such jobs incur a billing penalty because the second processor is locked out of any utilization. We looked for a peaking in memory utilization which would indicate that users were avoiding this lockout situation and found none. There was no data to support the SSD upgrade.

In these systems processing power, memory size, memory speed and auxiliary storage speed are essentially interchangeable commodities and all relate to processing capacity. Thus both of these upgrades are basically capacity upgrades and there is still considerable unutilized capacity in the system. Rather than increasing memory, a job can be run for ten hours rather than one and the ten hours is available. We concluded that these upgrades could at least be deferred to provide some financial maneuvering space to solve other problems. At an interim review meeting we suggested that this be done. Since then we have received considerably more input.

This input has not changed the basic parameters and we see no reason why a thorough assessment of the options and problem priorities could not be made over the next three months. We realize that this undoes work that has been put in place but the possible impact of this can be forestalled by demonstrating that the user community does not have problems of higher priority that need solving.

There is a second important reason for the memory upgrade. It will be needed when the system is converted from the CRAY Operating System (COS) to the UNIX Operating System (UNICOS). Four megawords of memory are required to make this transition without serious user disruption. We agree that the proposed memory upgrade is a clear requirement, but one which can be delayed until the first quarter of 1989 when the operating system upgrade is planned. The upgrade of the SSD in our view can be delayed until the system is saturated with work.

We recognize that these upgrades were planned because they are needed to expand the limited present configuration to one which is considered a fully configured CRAY X-MP. Our recommendation is that the University reduce its financial risk with respect to these upgrades by delaying them.

Increased loading will bring increased revenue and greater justification and thereby reduce the administration's financial and political exposures. With a saturated facility there will be more users with more motivation to seek more funding. Also effective capacity can be increased by using both charging and a peer review process to separate the wheat from the chaff. Further effective capacity increases can be achieved by acquiring other specialized equipment which would be very cost effective in displacing inappropriate jobs from the CRAY.

The university administration has taken considerable risk in taking the OCLSC this far. In the process it has assumed financial and political risk and been a subject of considerable criticism. Also as a consequence many Ontario and Canadian researchers have obtained easy access to the premier supercomputer facility in Canada. Is it not time to use the benefactors and the successes to date to finance the future with lower risk?

Some have suggested that the hardware upgrade cannot be deferred because the University has made indications to NSERC that the hardware will be upgraded. We do not think that one makes \$2.5M upgrades to achieve increases in \$194,000 grants. Certainly more support is required from NSERC and good relations should be maintained, but the commitments have to be commensurate.

Managing Capacity

It used to be that the bigger the computer, the lower the cost of unit computation. Today that is only so for jobs that benefit from supercomputer architecture. Cheaper solutions may exist for other jobs. If a problem can be done on a small computer, then that probably is the cheapest way to do it. There are many people still making this point and concluding that there no longer is a place for supercomputers. Supercomputers have a reduced but nevertheless valid role. There are some problems that because of solution time or memory space or speed of auxiliary memory or whatever, cannot be solved any other way. These are the problems that provide the justification for supercomputers. The rest come along for the ride because of availability, cost, appeal, turnaround, etc.

At the OCLSC, the problems that have to have a CRAY of the current configuration or larger have not been identified and so the justification is not known. Undoubtedly there are many jobs on the CRAY that could be solved on lesser machines at lower cost if the consequence were not that the unused CRAY time would be wasted.

If the system is lightly loaded there is no harm in executing a relatively unsuitable job on the CRAY. It will just take more time. When the system gets heavily loaded, a strategy for increasing the systems capacity could be to acquire other specialized systems onto which the work which is not cost effective on the CRAY may be off-loaded.

Just a simple analogy. A thousand ton crane is not suitable for lifting most things but it can lift anything under a thousand tons and lesser cranes will not lift a thousand ton load. The CRAY has a particular combination of speed, size and depth that makes it suitable for a large and varied class of very large computational tasks.

This is at least one of the situations that

has fueled the debate on campus. It could possibly be defused by recognizing the specialized nature of the situation. Identify the work that really must have a CRAY. Since these users can usually use an infinite amount of time, decide what their limit will be. Also make some time available to those who really do not need a CRAY and price it so that it encourages utilization while capacity is available and encourages the acquisition of more cost effective machines when installed capacity is being utilized.

Hardware Alternatives

Many people have made representations concerning alternative and/or complementary systems. The two prime candidates are massively parallel systems and minisupercomputers.

Massively parallel systems that use one hundred to thousands of processors in parallel are in their infancy. Some have been delivered, but it is not clear that they will be effective or effective for many problems. We were not able to propose a reasonable candidate for 1989 installation so we discuss this under future plans.

Minisupercomputers are more interesting. These systems appear to have achieved a price/performance breakthrough that is tantalizing. They provide 64-bit precision, about a quarter or a half of the processing power and much lower cost memory and disk storage. With very large memories they may be able to compete with the CRAY in throughput on selected problems. For other sets of problems they offer much more cost effective computing. It is possible that during the next year there will be adequately proven systems that could be acquired and maintained for four years for less than the contemplated upgrades to the CRAY.

Since we think that there is time before the upgrade decision has to be made, we think that the alternative should be seriously investigated. It will not be wasted work. At the very least it should indicate when this CRAY is likely to be displaced by minisupers. This is where technology is developing most rapidly: there is both wide open competition and explosive growth. The Consortium for Supercomputer Research predicts an annual installed unit growth rate of 87% and sales growth of 50% per year.

Administrative Effectiveness

The Centre has recently expanded its clerical and administrative resource and we expect that this will be sufficient for ongoing operations. There is, however, a need to develop a better model of the operation which will provide the Centre management with the capability of analyzing alternative pricing, scheduling and management schemes. The Centre has recognized the need for some of this and has initiated the rewrite of the system usage accounting package. We feel that more can be achieved with relatively little resource over time provided the determination is there and the need to make such information publicly available is recognized.

Facilities Management Contract

The OCLSC facility management contract with the University of Toronto Computer Centre is the most economical means of operating the CRAY X-MP. In U.S. supercomputer centres, such arrangements run the range from commercial firms as facility managers (San Diego, Princeton, CMU/Pitt, Alabama) to University subsidiary firms

(Minnesota, Colorado State), to an academic computer services management contract (Illinois, Georgia), integration with academic computer services (Purdue), to setting up a new organization (Texas, HARC). Of these, the academic services facility manager approach which has been adopted, is probably the least expensive for a semi-independent or consortial centre.

OCLSC has undertaken significant cost reductions to the current facility management contract for the coming year by reducing use of the IBM/CRAY Station and taking on greater administrative responsibility. As Centre utilization grows and revenue increases the fixed costs of facility management will tend to be less and less significant. Also, as UNICOS comes up and use of CRAY Stations decreases along with greater user interactivity, the need for human operator support will reduce, as long as capital expenditures for telecommunications access and increased disk storage keep up with demand.

Other Expenses

Other expenses amount to \$706,000 in the current fiscal year. They include consulting fees, external audit, expenses of the Advisory Board, office maintenance and repair, power for the CRAY, insurance, contingency, travel & expenses, training, office equipment, office computer software, computer/office supplies, telephone, internal communications, manuals, user training, promotion, memberships and subscriptions. Some of the line items are fixed, others quite normal and routine and the most extraordinary was \$66,000 for training which was primarily for preparing the staff for the new UNICOS Operating System and thus reasonable.

We checked to see what would happen to these costs if the Centre adopted a shutdown plan. Roughly half of these costs could be displaced if the intent was to provide nothing for the future and thus wind down the operation. For an ongoing operation we think the existing budget is minimal and reasonable.

Maintenance Agreement

The maintenance price of the system reflects the mean time between failures and parts costs that are inherent in the high power that the CRAY design uses. We recommend that the Centre explore whether other CRAY customers have investigated alternate approaches such as third party maintenance. As older models of the X-MP are replaced, it is to be expected that parts will become available from cannibalized systems. The Centre should also consider the form of maintenance applied to different parts of the system. Time and Materials maintenance may be appropriate to parts of the system. Less than 24 hour, 7 day coverage is already being used. The availability of additional disk drives from other installations should be explored; the DD39 disks are not new technology, and have been displaced by DD49 in many sites; more drives will be essential over time, and may introduce other maintenance options.

6 Organization

The Ontario Centre for Large Scale Computation enjoys a classical consortial academic services governance structure. (Figure 6-1). When such organizations are first set up, management and advisory committee members are usually chosen for their

representation of a constituency, whether academic, disciplinary or political. Over time, representation, particularly on technical advisory boards tends to become that of major users. Such a progression is generally favorable since the committees tend to become populated after two or three years with stakeholders in the enterprise, all of whom will work to insure its success.

The Management Board

The representation on the management board seems reasonable; the three outside members represent an opportunity to solicit computing, industrial access and federal funding expertise for the Centre. Now that the Centre is operating and the funding, marketing and public relations problems facing it are all quite clear, the board should be constituted by members able and available to assist in the solution of these problems.

We agree that the Management Board should concentrate its efforts on major policy and budgetary matters. We do not see this board providing operational guidance unless the Director and the Advisory Board cannot find agreement within established key policies and budget.

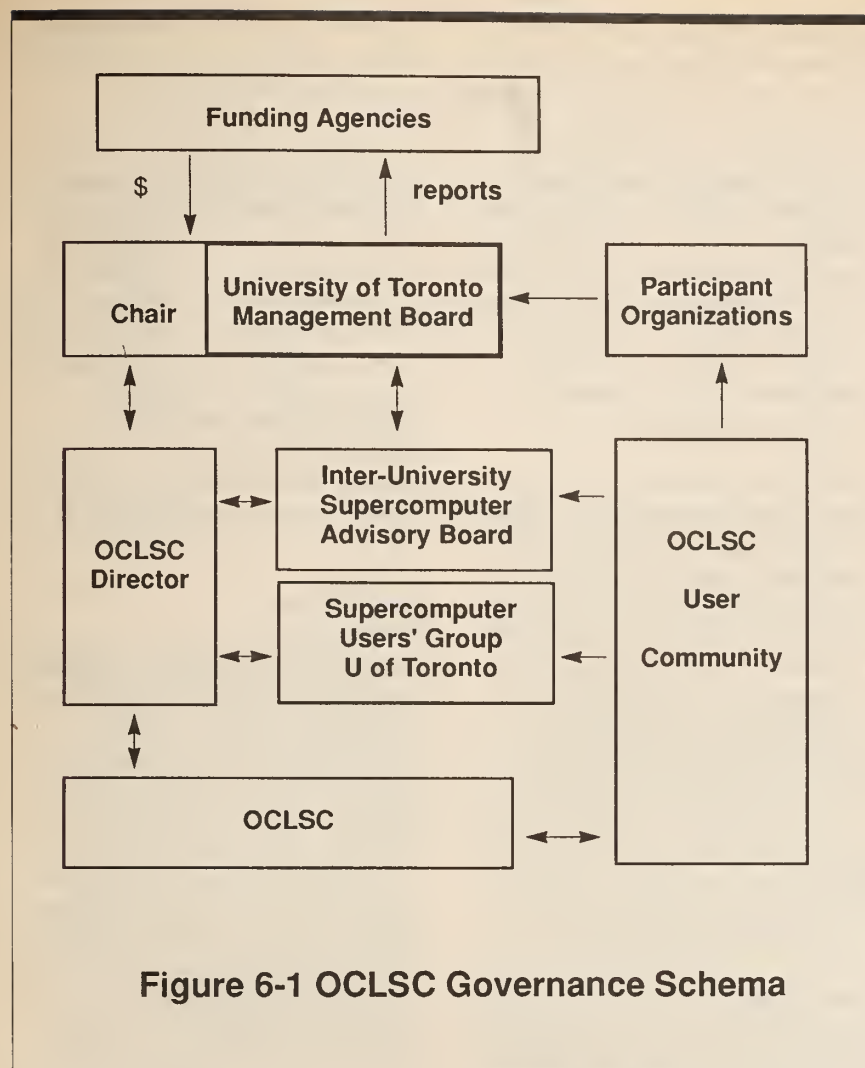
The Advisory Board

This board and its function are critical to the political success of the Centre. The current board should be expanded in accordance with its charter so that users from practically every university in the Province are represented. This group represents an opportunity for the Centre's management and Management Board to provide an important outreach to the other colleges and universities in the Province. Short of windfall funding for a telecommunications network, the really difficult problems of equal access and guaranteeing remote user satisfaction must be solved by this group. We suggest that membership be increased and task forces be set up to advise and plan solutions to problems in equal access, funding inequity, telecommunications, remote user services, remote user satisfaction, software acquisition, etc. In our view, this group should be the main source of input for operating practices, operating policies and services planning for the Director and the Management Board. (See Figure 6-1)

The OCLSC should see the Advisory Board as its preeminent client. The Advisory Board is an ideal forum for collecting diverse user requirements and reducing them into meaningful actions that the Centre could take or identifiable services that the Centre could offer. The Board is also a valuable mechanism for communicating with the user community and for resolving issues that the Centre could not possibly handle on its own.

The University of Toronto Users' Group

The University's own user group can play a major role not only representing the user communities to the Centre and its Management Board but also representing the Centre to the user community at the University and its scientific, academic and political constituencies generally. In fact, it is well within the self-interest of every major user to assist in the OCLSC public relations effort by acknowledging its presence in publications, encouraging colleagues to seek funding for its use in their research, being available for public lectures to lay audiences and serving as spokespersons to scientific, trade and general press. This group is well positioned by its interest, collective



experience and organization to play a significant leadership role in the development of the Centre. The Chair of the Users' Group and the Director of the Centre are missing an opportunity if they do not pull in the same harness to establish this supercomputer centre as a world class facility.

University Context

The OCLSC is well positioned in its context at a large research university with a facility management contract. While this may cause some political discomfort from time to time, there is no other alternative short of full government funding as an independent resource centre. The University of Texas System set up a very similar Centre with a CRAY X-MP 24 but operates it off the main campus at a major contract research facility. The Centre has been carefully presented as a system-wide resource and not an activity of the main campus. The four public and private research universities in Texas have also established a consortium in Houston called HARC (Houston Area Research Centre) to take on large joint projects. This Centre has installed a NEC SX-2 supercomputer. Short of a semi-independent consortial organization fully funded by the Ontario Ministry of Colleges and Universities, the location of the OCLSC at the University of Toronto is optimal. It allows significant cost savings over an independent or separately managed centre. The cost to operate the OCLSC as an independent unit would be significantly higher than as a facility managed by the University of Toronto.

Space Needs

The main clientele of the Centre is academic and the commercial clients clearly understand and are even attracted by the academic context. If there is an image which the facilities should project it is that of a well run academic facility which provides good service to all of its clientele.

It should not try to project an image of affluence which is an approach taken by many start-up companies thus it should try to fit into the academic environment without any connotation of inadequacy

in funding or permanence. There should also be significant provision for change because staffing, services, and resources of the Centre will have to be responsive to changing needs.

We looked for criteria that we could use to establish guidelines for space and selected the following:

The space should provide an impression of business-like effectiveness that fits into the academic context. Long term users will come here for that context.

The access to the computer for the OCLSC staff should be as close to that of the remotest user as practicable. Systems that experts build for other people to use are invariably unusable. Never buy shoes from a shoemaker who does not wear shoes: they will be unwearable. Interfaces designed and implemented by people who have to use them themselves will become usable over time.

The support staff should be as visible as possible at the remote locations and there should be at least one OCLSC representative at each Ontario university which is a user or a potential user. Remote visibility should always take precedence over the need for critical mass at the Centre. Whenever staff travel can reasonably be used to avoid user travel, then the staff should travel.

Specialized equipment such as graphics terminals should not be used as a means for departing from the above guidelines.

The proposed space for the Centre will be adequate for the next few years if properly remodelled. We do not agree with the plan to divide the space up into a warren of small, low ceiling individual offices. Private offices should be provided for the director, marketing manager and the technical services manager. The industrial affiliates require secure facilities, but not all space needs to be walled off and there is no need to be prepared for more than two

unsigned partnerships. Whenever possible the people in the open space should be given outside awareness. This means offices and other walled off areas should be in inside space. The overall environment in the very low-ceilinged area can be significantly enhanced by replacing the present opaque glass with transparent glass in the windows overlooking the atrium.

We recommend the entire Centre office area be carpeted and furnished with modern, high tech modular office partitions and furniture with ample storage space. Plants are very important for making the space congenial. The overall image the Centre wishes to create is that of a forum or concourse for high technology. The space will benefit from a better arranged entry than through a staff lounge.

We understand the efficiency and utility of a dedicated classroom, but it is perhaps most indicative of an inappropriate attitude. The OCLSC is called a centre to communicate a focussed effort, but it should try to operate more like a distributed centre. The best way to assure that classes go to users is to not have a classroom at the Centre. There is a need for a small presentation or conference room.

We detected a strong desire to solve all future space needs with the upcoming fitup in the Koffler building. A supercomputing centre must grow, adapt and change. Thus there can be no permanent solution and the thought of having achieved one will prove confining.

There is a real urgency to getting this space prepared as soon as possible. The present space and interim housing arrangements are quite inadequate and inappropriate.

Other specifics about the 03-25-88 plan for the Koffler space are:

There should not be room for more than three or four technical services staff.

They should be located in open areas with visible access to the outside or the atrium.

The graphics lab area should be open and needs non-glare lighting. Sound absorbing materials should be used throughout.

There should not be an expectancy of many visitors.

The area beside the air vents to the atrium should be used for storage.

The industrial partners must have convenient parking spaces.

7

Strategic Technological Outlook

There is no universal definition of what a supercomputer is. Neither is there a universal supercomputer. They are what they are because of specialized advantages over general purpose computers which makes them more suitable for selected computational tasks that are very large in some dimension. Thus they are special purpose machines that employ some aspect of today's state-of-the-art in computational performance to do something that could not be done before. They provide an enabling capability for research scientists and high technology industry.

Factors in Supercomputer Design

An ideal supercomputer would be a very fast scalar system with a very large real memory and fast I/O because such a system would produce small variations in performance across a wide range of algorithms, and therefore involves the application designer in hardware considerations as little as possible.

Unfortunately, peak scalar speed is dictated by circuit or clock speed, and the clock speed of very high speed systems is limited by technology and packaging, even when reliability is compromised by the use of high power levels. The 100KW power consumption and relatively low MTBF of the CRAY involve high operating costs; they are a consequence of the design goal of maximum performance. Fast silicon technology is increasing in density, but has not increased significantly in speed, and slow progress in the clock speed of very fast systems will continue until new technologies like GaAs and HEMT are available. As an example, it took 7 years for the CRAY 1 to double the scalar speed of the CDC 7600, and 12 years for the Y-MP to double the speed of the CRAY 1; the next cycle will be faster, with Cray forecasting 1989 for the introduction of the CRAY 3, which will use GaAs to achieve a 2ns cycle. This slow progress at the leading edge contrasts with the much faster progress being achieved in slower (and cheaper) systems, where clock speeds are rapidly moving from 200ns to 25ns. Linear progression in these systems should not be assumed, however, because the ground rules for system design change dramatically at around 10ns, and only two design teams in the world have so far been able to implement systems at higher speed.

One option open to the designer is to minimize the complexity of the processor in order to achieve faster scalar speed. RISC systems are attractive in this respect; they use 32 bit data paths and include no vector instructions, and achieve scalar instruction execution rates of 1 instruction for every 1.5 cycles, compared to 1 every 3 cycles on the CRAY. These systems give very high MIPS rates but in the floating point work that characterizes much scientific computation the housekeeping instructions that are included in these MIPS counts need to be deducted. Nevertheless, at least two companies plan to introduce RISC scalar processors in the supercomputer class in the next 2 years.

To overcome the limitations of scalar speed, design alternatives have been explored that include vector and parallel systems; in addition to increasing system complexity, both involve the programmer by requiring algorithm optimization or data reorganization in order to extract the potential speed from the system. This limits the rate at which applications can be ported and optimized.

Vector systems focus on floating point arithmetic, and create pipelines that assume that exactly the same instructions will be used for large vectors of data. This assumption is frequently correct for numerical simulations, but exploitation of the vector capability is highly dependent on the numerical methods and data structures employed in the computation. Achieving high vector speed without compromising scalar speed is critical as

A COMPARISON OF SCALAR AND VECTOR

% of vectorisation achieved													
	0	10	20	30	40	50	60	70	80	90	95	100	
System 1	1.0	1.1	1.2	1.4	1.6	1.8	2.2	2.7	3.6	5.3	6.9	10	
System 2	0.8	0.9	1.0	1.1	1.3	1.6	1.9	2.5	3.6	6.5	10.8	32	

TABLE 7-1

the above table shows, for two alternative implementations. The first offers peak vector speed 10 times that of scalar, which approximates to the CRAY X-MP1; the second provides peak vector speed 40 times scalar, but compromises scalar by 20% in order to do so. The table shows relative speed. (See Table 7-1)

The moral is clear; on System 1, it is theoretically possible to find algorithms that can approach 10 fold speedup in vector, but vectorisation levels have to reach 60% in order for the scalar speed to be merely doubled. In System 2 the cost of compromising scalar by only 20% in order to achieve a potential 40 fold speed up in vector causes lower performance in all applications with vectorisation levels under 90%! The DOE laboratories have recently released data that shows that even in batch work, they average only 70% vectorisation after over 12 years of experience. This bounds the speed they can get from their vector systems, but they still provide the fastest means of getting their work done!

The success of the CRAY, over competitors that offer higher vector speeds, is the attention that has been paid to integrating vector whilst still maintaining the highest possible scalar performance.

Parallel systems architectures are evolving along two paths; gradually increasing numbers of very fast vector processors, and very large numbers of small processors. As for vector systems, the effective use of parallel systems entails algorithm dependency. It is claimed that partitioning can be applied to most algorithms that vectorise, and to many that will not, and that parallelism is more common in nature, enabling parallel algorithms to be applied more frequently. This may be true, but the numerical computing community has invested 12 years in learning to apply vector methods, and very little so far into parallelism.

The principal disadvantage to using parallel systems so far has been the difficulty of programming inter-processor communications. A Canadian company, Myrias Research, is on the point of bringing to the market an ingenious solution to this problem that is effective for massively parallel systems.

As both vector and parallel designs offer different but substantial improvements in performance for algorithms appropriate to their features, it is probable that both should be available to researchers in a future supercomputer centre. A primary decision for the equipment will be that they not only allow the easy development of efficient programs, but that they facilitate the importation of programs developed elsewhere, ie they do not involve substantial code modification.

Memory speed has not kept pace with logic, but fast memory is critical to avoid latency delays in scalar and short vector operations. Memory requirements unfortunately correlate with system speed; fast computers enable larger

problems that require large memory to provide the higher resolution that increases their accuracy, and the cost of large, high speed memory often dominates the cost of the system. The CRAY 2 is an example of a radical departure in system design that took advantage of the emergence of 256K bit memory technology to make a supercomputer available with huge memory; unfortunately, the memory speeds available required a hierarchic implementation which necessitated total redesign of operating system and user programs, and scalar speed also suffered relative to the X-MP. Reducing prices have since enabled Cray to re-memory the CRAY 2 in faster technology, and a similar architecture will be used for the CRAY 3. The CRAY 2 represented a breakthrough in memory and will change the way computer applications are designed.

Applying the Technology

We believe that the purpose of the OCLSC is to enable Ontario scientists to have access to the leading edge of computer technology in order to explore the extent to which computation can advance their own disciplines.

User expectations and requirements change as applications of numerical modelling migrate from research into production. As an example, research on computational fluid dynamics (CFD) in the 1970's used Euler approximations to prove the value of CFD in augmenting wind tunnel experiments. This work was successful to the extent that the Boeing company now spends over 25% of its wind tunnel engineering budget on CFD; as this level of technology migrated from research into engineering, research has now moved on to demonstrating the higher benefits that will be gained by using even faster computers to model the full Navier Stokes equations. Four major areas of advantage have been identified for computational methods in this application:

The ability to "instrument" numerical models in areas of high interest, where physical instrumentation would not be possible - eg., the wing/body junction.

Avoidance of the delay involved in creating physical models and dependence on the specialized modelling skills that they necessitate.

The freedom to explore a wider range of alternative designs in search of an optimum.

Shortened design and test cycles and time to bring products to market.

If the intent is to support research that uses supercomputers, rather than research on the development and use of supercomputers then a mature system is required. Burdening researchers with the software and systems problems of an immature technology can substantially hinder work in their own discipline.

It is also important to distinguish the role that supercomputers play as part of

a range of computing services that are necessary for research; supercomputers are not necessarily easy to use, easy to access, suitable for all forms of computation, nor are they necessarily the most cost effective means of delivering computing cycles for many classes of application. They do, however, provide the fastest means of getting the job done. Supercomputing fits into a continuum of computing needs; it is justified for those problems whose scale is beyond the capabilities of other configurations in terms of speed or memory.

For a class of problems which may be large, a supercomputer may also provide more cost effective computing for work that could also be done on smaller systems. The break even point between cheaper local systems and larger central facilities is clouded by the implementation of accounting systems and arguments of accessibility, convenience and ownership, and has been argued continuously for over 20 years. The most cost effective way to provide computing cycles for smaller tasks is open to argument; the unique ability of the supercomputer to be applied to the largest problems is not.

Because supercomputers are not easy to use or operate, place major pressures on other facilities, and are intended for use by non-computer scientists, their installation requires an appropriate infrastructure of management, support personnel knowledgeable in systems and application software, numerical methods and optimization, and administrative support including allocation procedures and high bandwidth communications facilities. As the purpose of the OCLSC is to enable researchers to explore the use of very large scale computation, its facilities must be readily usable by the non-computer scientist, which implies;

Compatibility with the supercomputing facilities used by co-workers, in both language implementation and memory requirements.

Effective communications access; 2400bps access to a 100MFLOP computer represents only 37 numbers/sec, and will take over an hour to transmit a single color image of the type now being produced as a matter of course by high speed systems.

Support staff who can overcome the unfamiliarity and "fear" of the system.

Stable software that does not involve the researcher in diagnosing and bypassing problems that result from system immaturity.

A wide range of applications software and utilities that encourage the researcher to explore and extend the application of the technology, and

That the configuration be appropriate, in order to avoid the need to extensively modify or rewrite programs developed at other installations.

The widespread use of CRAY systems by other researchers, the large body of available software, and the maturity of the hardware and system software make it an appropriate base for researchers to explore the value of very large scale computation.

As supercomputing is emerging as a significant adjunct to experimental engineering and science, the need has grown for visualization to assimilate the enormous quantities of output and

increase understanding of the modelling process. If it is interactive, visualization can also provide the basis for determining the progress of a calculation; early termination of a diverging calculation can save hours of system time. Interactive graphics can only be provided by very high speed communications; post processing graphics can be provided by specialized workstations and are less demanding on communications requirements because the output data base, rather than rendered coloured images, are transmitted; we expect to see a high growth in demand for graphics facilities and the attendant communications at OCLSC.

Projections Processors

The determinant of processor technology is the relationship between scalar processing speed and cost. System developers can innovate a systems architecture that implements RISC or CISC, and adds vector instructions or parallelism, but the scalar speed/cost relationship determines the state-of-the-art. It is significant that Cray has just announced their 6ns Y-MP and followed it by a significant extension of the X-MP; one implication of the announcement is that 6ns systems are not going to be introduced across the range as quickly as it seemed.

We expect the trend of scalar speed in various classes of system to be as follows; the classes are delimited by price. There are two classes that are sometimes differentiated but that are implicit; the "minisuper" combines supermini scalar technology with vector and parallel extensions and is therefore included in the supermini class, and the "near supercomputer" that combines mainframe technology with vector extensions (most mainframes already have parallel systems of fast scalar CPU's) a new class of scalable, massively parallel systems of fast scalar CPU's a new class of scalable, massively parallel processors (MPP) will become available, based on microprocessor technology. (See Table 7-2)

Vector capability and parallelism will be available on all classes of system, up to the levels of parallelism shown. In workstations it may be specialized to graphic image processing. We must reemphasize that comparisons of 32-bit entry level CPU price/performance with fully configured systems will result in very distorted conclusions.

The table assumes no quantum jumps in technology; although there are startup companies planning products that could distort the table, including 150-250 MIPS scalar systems in the supermini price class within two years.

Memory

The memory required to use a fast processor well varies with the nature of the problem; speed enables greater resolution which requires a larger matrix, and there is a third/fourth power relationship that can be defined to approximate this. As a rule of thumb, a satisfactory system memory size has usually been in the order of 1MB/MIP. As each of the OCSLC X-MP processors rate the equivalent of about 45 MIPS, each should balance well with 45MB, ie 5MW, or the closest available from CRAY, which is 4MW. This would imply 8MW for the two processors, but the ability of the processors to allocate memory dynamically between the CPU's to balance large and small memory tasks should enable the system to give good

TRENDS IN SCALAR PERFORMANCE

Scientific scalar uniprocessor MIPS (64 bit precision)

	Workstation \$10K-100K	Supermini \$100K-1M	Mainframe \$1M-\$10M	Super \$5M-20M	MPP \$0.5-20M
Price range					
First ship Date					
1988	14	15	45	45	3
1989	20	30	45	65	20
1990	30	40	45	65	20
1991	40	60	70	100	30
1992	40	60	70	100	40
Max level of parallelism by 1992					
	16	16	16	64	4000

TABLE 7-2

performance with less than 8MW.

Over time the enabling capability of large memory, which reduces the need for complex and time consuming I/O programming, will produce pressure; the availability of 256K, 1M, 4M and 16M technology is going to radically alter our view of the use of memory, and early use of the CRAY 2 is demonstrating this. Cray have recently increased the physical memory available on their X-MP family by a factor of 4 but, more significantly have increased the addressing capability to 512MW, which allows for further future expansion.

Peripherals

The SSD allows less expensive, slower memory to augment limited main memory at the expense of I/O programming by the user. It is an effective peripheral for the CRAY X-MP and Y-MP and appears to be planned as a key feature of Cray's UNIX implementation, to enable the virtual features of the operating system. Because memory demands grow over time, and in view of the absolute limit of 4MW on the OCLSC X-MP2, it is likely to be of value to an increasing number of users.

Disk storage technology continues to advance slowly, with increases in density and capacity being more readily achievable than in access and transfer speed. The OCLSC system appears to have very limited disk storage; we would expect this to imply low system utilization, which could be masked by limited current loading of the system and by the SSD; or a great deal of data movement, either archiving to tape, which is operator intensive, or over the network, which bottlenecks the resource for others. A more usual configuration would have in the region of 0.25-0.5GB/MIP of high speed disk, ie around 20GB on the OCLSC system, which currently has under 5GB.

Communications

Supercomputers generally need files of input and generate large quantities of output. They can be used in batch mode, in which the data can be staged at various intermediate systems, or interactively, in which case the communications link must carry the data volume in real time. CRAY's were designed for batch use, but pressure for interactive use, especially with graphic output, is growing. Even in batch mode, there are significant advantages if a researcher can get the results of his test back fast enough to maintain his concentration on the project.

The most common high speed link today is 10Mbps Ethernet, but it is very probable that the new 100 Mbps FDDI standard will proliferate from 1989 onwards, and planning should assume that this will quickly become the

backbone network of choice, and the vehicle for graphic access to the Centre.

Obsolescence

It has been asserted that the OCLSC system used 5 year old technology; the foregoing discussion has made clear the importance of obtaining fast scalar, rather than vector performance, and it should be noted that in the intervening period since the X-MP was first shipped, only Cray Research and NEC have surpassed the scalar speed of the OCLSC system, and that by only a small factor. The fast scalar and well balanced vector performance of the X-MP should keep it in line with most other supercomputer installations for several years. Early shipments of faster systems like the Y-MP and CRAY 3 will be slow, and significant numbers will not be available until 1990 and beyond. Other technologies will approach the performance of the OCLSC system over time; examples include the new Amdahl 5990, which has scalar speed close to that of the CRAY, but has no vector capability; and the ETA systems, which have not yet achieved their design performance but will offer higher vector speeds, at the expense of scalar.

Areas in which the technology of the X-MP2 will become increasingly dated are the limited memory size, the limited ability to explore multiprocessing (barely worth the investment of programming time to utilize only two processors), the high maintenance cost, and the low price at which increasingly competitive speed can be obtained. The X-MP will remain current as a solver of the very largest problems for longer than it will as a cost effective computer for smaller problems, as Table 2 clearly shows; in making comparisons between the CRAY and alternative systems, however, it is essential that the comparison is consistent, and is based on systems of 64 bit architecture, of comparable memory, and with I/O of comparable size and speed; chip or CPU comparisons alone do not tell the whole story.

External to the CRAY, major changes are taking place in communications and in graphics; if OCLSC is to be successful as an ongoing provider of services and to be enhanced, these and administrative infrastructures must be developed. Convenient access at appropriate speeds must be available for all researchers who use the service, and very high speed LAN technology will be needed. The FDDI standard, which provides token ring communications at 100 Mbps on fiber over distances of 100 Km, will be implemented in board level products in the next 18 months, and will have a profound effect on data distribution and the balance between central computing and the desk top. FDDI speeds will provide a means to satisfy a part of the emergent demand for graphics which

will evolve as a means of enabling the visualization of simulation in process, as simulation increasingly augments experimental science. The bandwidth of 3D color graphics in real time is enormous, of the order of 600Mbps, but this application is already attracting increasing attention in the supercomputing community. Significant priority should be given to high speed communications and to high resolution graphic access to the CRAY.

A forecast of the structure of research computing in Ontario in 1995 is like comparing 1988 to 1981, when the CRAY 1 was only used in DOE laboratories, the CDC Cyber 205 had been announced with an 800 MFLOP capability that promised to eclipse the CRAY 1, when LAN technology was experimental and before the PC was announced. By 1995, similarly remarkable innovations will have emerged, and so our forecast must be read with some latitude!

By 1995 we believe that researchers will see elsewhere and want to access:

Multiprocessing scalar/vector systems with up to 64 processors with memory of 512Mwords (2GB), and a 1ns cycle time.

Massively parallel systems with up to 4000 processors, each capable of 60 scalar MIPS and a system memory of 512 million words.

Both of these systems, fully configured, will be priced in the range \$10-20M US and small configurations will be available starting from under \$1M US.

Departmental systems offering very fast scalar capability as compute/disk/ and communications servers. These will be 10ns systems, priced from \$250K US.

FDDI communications from local user networks to the supercomputer centre and to departmental systems, with selected devices for graphics connected directly to an FDDI channel or to 1Gbps channels that will be available.

Local networks connecting desk top devices will probably be at 10-100Mbps.

Desk top technology will provide 10+ MIPS in PC level devices, with accelerator boards for graphics, user interface processing, floating point acceleration (including vector) and communications.

Workstations will provide 60MIPS and will offer expanded graphic capability.

The software that integrates all of this hardware will be based on one of several implementations of UNIX, but with new interfaces that will greatly improve the user interface. TCP/IP will be being replaced by ISO standard communications interfaces, and the primary programming languages will still be FORTRAN and C, or C++, with parallel extensions and the extensive use of embedded graphics.

Improved capability and a common software environment will bring radically new use to the system in the areas of image processing, with the use of paper minimized. Electronic mail will replace telephone tag and documents will be scanned and

distributed over the communications network. All of these facilities will make it easier to communicate remotely, and will encourage work from home, the ability for researchers to network into their colleagues in other locations, and will reduce travel.

None of this will happen overnight, but the key technologies that enable it should be followed and implemented as they become available. The CRAY X-MP will, with upgrades to its memory and disks, remain current with supercomputer technology through 1990, and will then appear increasingly dated. It would seem appropriate to introduce massively parallel technology into the Centre around 1990 and to plan the replacement of the CRAY with a current fast scalar/vector system, which will include limited parallelism, around 1992. In the meantime, the infrastructure to enable fast, fair, efficient access to a shared facility needs to be developed. This plan relates to the high speed central facility; we believe that cheap computing can be provided for many users through lower speed technology; today this includes board level products that will accelerate a Sun 3 or PC/AT to VAX 8700 speed for \$12K, and shared departmental systems that will provide 1/4 of an X-MP's speed for \$500K, or 1/10 of its speed for \$50K. These will remain a valuable supplement to academic computing and should not be discouraged where they are effective.

8

Supercomputing in Research Universities

Computational Science is rapidly emerging as a third branch of discovery alongside theoretical science and experimental science. Further, computational science and engineering are represented in supercomputing as an enabling technology which promotes the development of other new technologies and ultimately economic development. The research university has become a focus for supercomputer funding and development over the past five years, and for good reasons. While supercomputing as a technology has shown an overall growth rate in excess of 35% its continued spread is limited by the availability of application programs, trained staff to employ existing applications and even more so by lack of highly trained staff able to create new application programs. As the wellspring of new technology and primary source of trained scientists and engineers, the research university is the logical institution to house supercomputing development centres. While Japan has targeted the supercomputer industry in the West, and we are joined in battle, the winner of the engagement will not necessarily be the side that sells the most supercomputers but rather the country that provides its scientists and engineers the earliest and best access to the technology. Thus, Canada is able to play a significant role in this effort, and for reasons of competitiveness in international markets, must attempt to do so.

Significant federal government sponsored initiatives are already underway in several countries. In Japan vendors are encouraged to provide early models of new supercomputers to major universities at little or no cost as new

operating support is built into their budgets by funding agencies. There are nineteen supercomputers in Japanese universities including one ETA 10E8.

In the United States the Lax Report in 1983 led to the development of the Division of Advanced Scientific Computation in the National Science Foundation. The Lax Report recommended \$100 M annually for five years to fund ten general purpose centres in addition to the National Centre for Atmospheric Research which serves as a discipline oriented centre. The goal of the program was to place 100 CRAY 1 equivalent units of supercomputing at the behest of US academic researchers. The final funding delivered was \$50M/year for five years, however, even this lesser sum has been further reduced to well under \$40M as US federal budgets have suffered attrition. A new proposal has been placed before the NSF and House Science, Space and Technology Policy Committee which calls for spending \$300M per year over the next five years.

State initiatives in Colorado, Minnesota, Indiana, Texas, California and Ohio, inter alia have supplemented the federal program administered by the NSF/DASC. There is about \$85M available in the current US economy to fund academic supercomputing. It costs about \$8.5M per year to operate a centre (including debt service) and there are now 17 in operation plus others in planning. Consequently all, including the NSF Centres, are seriously underfunded. In the United Kingdom, the Forty Report encouraged government funding for supercomputing in universities. Unlike the U.S. approach, for which almost all funds available were spent on five large centres, the U.K. plan calls for 40% on departmental minisupercomputers and 20% for telecommunications network access. In the Federal Republic of Germany a very similar plan is being implemented by the Gesellschaft fuer Mathematik und Datenverarbeitung (GMD) in Bonn.

Canadian universities enjoyed some early supercomputer installations but have fallen behind the pace of those in other countries. The early initiatives were university or provincial government funded but current federal government funding sources for academic supercomputer access in Canada are clearly inadequate to the demand. France, Italy, Switzerland and The Netherlands have major federally supported installations underway or in advanced planning stages. Interest has been shown by universities in Sweden, Norway, Finland, Singapore, Taiwan and Korea as well.

Canadian research universities have the opportunity not only to stay abreast of peer institutions in the US, Western Europe and Japan by federal support of existing and planned provincial initiatives in Ontario, Alberta, Quebec and British Columbia, but also to exert leadership into the next wave of computational science employing parallel processors. A major parallel processor architecture has been designed and will be manufactured by Myrias Research, Inc. in Edmonton. This architecture offers a cost-effective scalable approach to high performance computing and its development in Canada offers Canadian universities the opportunity to lead the rest of the world from vector processing into parallel processing for computational science and engineering in the 1990's.

Alternatives to the Supercomputer

A supercomputer is ultimately justified by its ability to perform calculations that are impossible or infeasible on smaller systems. Many calculations routinely done on supercomputers can often be done on minisupercomputers or mainframe vector processors. For some applications a distributed network of minisupercomputers (e.g. Alliant FX/8, Convex C-1, SCS-40) may even be considered as an alternative to a central supercomputer installation.

In academic research, distributed minisupercomputers are able to perform smaller scale research computations and even excel in instructional usage. They cannot compete with the true supercomputer on very large computational problems, and the distributed network alternative also attracts greater labor costs. Mainframe vector processors are often employed in situations in which the computational science workload (e.g. CAD/CAM or actuarial science) is ancillary to a major mainframe application environment (e.g. manufacturing or insurance). Only a few experimental academic supercomputer installations are made up of fully optioned mainframe vector multiprocessors.

The massively parallel processor may begin to supplement the vector supercomputer by 1990 in many general purpose application environments. Today's parallel processors already show both performance and cost performance gains over vector supercomputers in dedicated or embedded special purpose applications. Most observers consider the primary mode of computational service delivery in the 1990's to consist of networks of "super" workstations (e.g. SUN 4, ARDENT, IRIS) connected by 10 mHz or better LAN to local minisupercomputers and remote supercomputers. While the end user may do 90% of his or her activity on the local workstation in some applications, 90% of the computer cycles executed will be performed on the remote supercomputer.

Funding the Academic Supercomputer

Although there are idealistic funding models, in practice there exist a broad spectrum of alternatives. The NSF Centers in the United States were intended to be fully funded by cooperative agreements between state governments or university consortia and the federal government. Time allocations are then passed out to NSF principal investigators by a peer review process. Underfunded telecommunications access limits some users and federal funding cutbacks have crippled NSF Center budgets. It was thought that the centres could supplement their inadequate budgets by selling time to commercial users. Centres in the United Kingdom, France and Germany have also tried to sell commercial time to supplement inadequate budgets but without notable success.

The San Diego Supercomputer Center is most successful but is able to sell only 3% of its time commercially. The potential market for supercomputer time sales to private industry is handicapped by a dearth of trained application users in industry, one of the very problems that supercomputer academic access programs are designed to solve. While such a market may develop by 1991, it is not wise to build its exploitation into current budgets.

A more effective way of involving industrial supercomputer users in academic centres and their support is an industrial partner program. Such a program was developed around the CRAY-1 installed by The University of Minnesota Computer Center (UCC) in 1981. The program involved General Electric, Intel, Gruman Aerospace, Hughes and TRW. Each firm agreed to purchase \$30,000 of CRAY-1 time each month for eighteen months in addition to paying for ancillary human and system services. The National Center for Supercomputer Applications at the University of Illinois has developed a much more ambitious program which currently involves five firms for three years at \$1M per year. While the industrial partner can use up to 1000 hours of CRAY X-MP time each year, they do not join to get cheap time. The motivation is to obtain a competitive advantage by earlier technology transfer and by training professional staff in the latest computational and application technology.

Table 8-1 presents the scientific and technical applications activity in research universities worldwide. Twenty-four disciplinary areas were clustered into eight major categories: the physical sciences the geosciences the biosciences the social sciences the mathematical sciences the engineering sciences multidisciplinary research other, including education

The supercomputer centers represented are the five NSF Division of Advanced Scientific Computing Centers as a group; the federally funded supercomputer centers at the National Center for Atmospheric Research (NSF) and at Florida State University (DOE); the nine university centers with state support are clustered under "other". The results are summarized in Table 8-1 to give a worldwide 1987 baseline of 149 CRAY-1 equivalent units of Class VI supercomputing in research universities. This resource is currently utilized to the extent of the 129 CRAY-1 equivalent units. (See Table 8-2)

Application Forecast

The worldwide forecast of supercomputer capacity growth in research universities is given in Table 8-2. The overall growth rate leads to a factor of two increase in true supercomputers by 1992. The growth forecast for supercomputing capacity in Canada appears anomalous, but the high ratio is due to four factors: the small 1987 base, the installation of ETA 10 systems in 1988 which are expected to grow to be much larger, the emergence of a Canadian supercomputer manufacturer (Myrias Research Corporation Inc.) likely to place large systems in a number of Canadian universities, and the likelihood that NSERC supercomputer funding for principal investigators will begin to appear in larger amounts by 1990. Table 8-3 presents the five year forecast of applications based on the 1987 actual usage baseline. (See Table 8-3)

ACADEMIC SUPERCOMPUTER APPLICATIONS, WORLDWIDE 1987 (CRAY-1 EQUIVALENT UNITS, ROUNDED)							
Application Area	NSF DASC	USA Other	Canada	Europe	Japan	Total	%
Physical Sciences	11	11	2	28	12	64	52
Geosciences	5	8		5	3	21	16
Biosciences	3	1		1	2	7	6
Social Sciences		1				1	1
Mathematical Sciences	1	1		1	1	4	3
Engineering Sciences	4	5	1	6	6	22	17
Multidisciplinary	2	1				3	3
Other including Education	1	0		1		2	2
Total Utilized (CEU)	55		3	42	24	124	100 %
Total Available (CEU)	68		4	51	27	149	

TABLE 8-1

FIVE YEAR FORECAST GROWTH OF SUPERCOMPUTER CAPACITY IN RESEARCH UNIVERSITIES WORLDWIDE (CRAY-1 EQUIVALENT UNITS , ROUNDED)

Year	US	Canada	Europe	Japan	Total
1987	68	4	51	27	149
1988	99	8	57	30	194
1989	121	10	63	32	226
1990	137	16	68	37	258
1991	147	19	73	44	283
1992	153	21	77	49	300
Increase 5-years	2.25	5.25	1.5	1.8	2.0

TABLE 8-2

Compared with the baseline in Table 8-6 it appears that the physical sciences which today consume 52 percent of these resources will consume 39 percent in 1992. The geosciences will fall, but the biosciences will more than double from six to fifteen percent. The social sciences will also double, and the engineering sciences will increase from seventeen to twenty-two percent.

Table 8-5 presents a similar forecast for one, three and five years for minisupercomputers (i.e., systems having less than one CRAY-1 Equivalent Unit (CEU) in performance per system in 1987). This forecast shows much lower growth in the physical and geosciences but a much larger growth rate in all other areas, including the engineering and biosciences.

FIVE YEAR FORECAST GROWTH OF SUPERCOMPUTER APPLICATION TECHNOLOGY IN RESEARCH UNIVERSITIES, WORLDWIDE (CRAY-1 EQUIVALENT UNITS, ROUNDED)

Application Area	1987	1988	1989	1990	1991	1992	%
Physical Sciences	64	81	90	96	101	104	39
Geosciences	21	25	30	35	39	41	16
Biosciences	7	12	18	25	31	36	15
Social Sciences	1	2	3	5	6	6	2
Mathematical Sciences	4	6	7	8	9	9	3
Engineering Sciences	22	32	39	48	54	58	22
Multidisciplinary & Other	5	6	7	8	9	9	3
Total Used (CEU)	124	164	194	225	249	265	100%
Total Available (CEU)	149	194	226	258	283	300	

TABLE 8-3

The combined forecast in Table 8-6 predicts application utilization in research universities worldwide of 574 CEU by 1992. This represents an increase of 3.7 times in five years. The major increases are in the social, mathematical and biosciences. The major developing applications indicated by the forecasts presented in this section can be recognized from the comparison given in Table 8-4.

CHANGING DISTRIBUTION OF SUPERCOMPUTER APPLICATIONS 1987 TO 1992

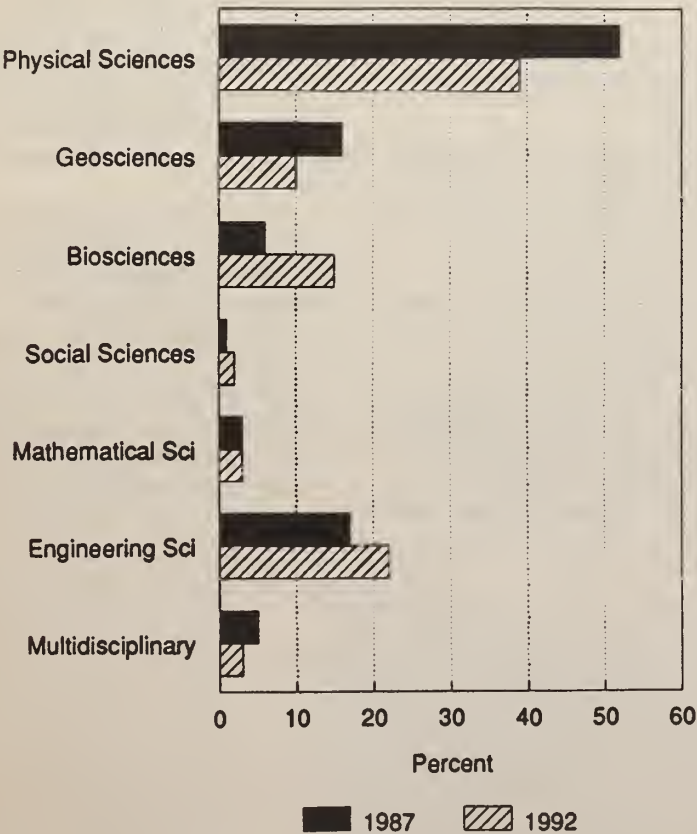


TABLE 8-4

MINISUPERCOMPUTERS IN RESEARCH UNIVERSITIES, WORLDWIDE (CRAY-1 EQUIVALENT UNITS)

Application Area	Forecast Applications Demand				%
	Today 1987	1 year 1988	3 year 1990	5 year 1992	
Physical Sciences	12	15	24	40	13
Geosciences	4	9	17	22	7
Biosciences	2	10	32	62	20
Social Sciences	1	3	9	16	5
Mathematical Sciences	2	6	27	53	17
Engineering Sciences	10	19	45	93	30
Multidisciplinary & Other	1	3	13	25	8
Total (CEU)	32	65	177	311	100.0%
Systems (estimated)	120	195	442	620	

TABLE 8-5

**COMBINED 1, 3, AND 5 YEAR FORECASTS FOR SUPER
AND MINISUPERCOMPUTERS**
UTILIZED IN RESEARCH UNIVERSITIES WORLDWIDE WITH
APPLICATION DISTRIBUTION

Application Area	Today		Forecast Applications Distributions					
	CEU	%	1 year CEU	%	3 year CEU	%	5 year CEU	%
Physical Sciences	76	49	96	42	120	31	144	25
Geosciences	25	16	34	15	52	13	63	11
Biosciences	9	6	22	10	57	14	98	17
Social Sciences	2	1	5	2	14	4	22	4
Mathematical Sciences	6	4	12	5	35	9	62	11
Engineering Sciences	32	20	51	22	93	24	151	26
Multidisciplinary & Other	6	4	9	4	21	5	34	6
TOTAL	156	100	229	100	392	100	574	100

TABLE 8-6

Interviews Conducted

Almond, James	University of Texas System
Amrhein, Carl	Geography
Bader, Richard	McMaster
Balcolm, Graham	BC study
Boyle, Terry	OCLSC
Bronskill, Michael	Princess Margaret
Cioni, Maria	Ministry of Colleges and Universities
Connell, George	President, U of Toronto
Cummins, Roger	Ministry of Colleges and Universities
Egelstaff, Peter	Advisory Committee, etc.
Goldak, John	Carlton
Goodman, Brian	Ministry of Colleges and Universities
Gotlieb, Kelly	1987 Review
Halliwell, Janet	NSERC
Hayworth, Al	Networking, Simcoe Hall
Hoey, Eamon	Communications
Jackson, Warren	UTCS
Keffer, Jim	Vice Provost
Kronberg, Phil	Supercomputer Users' Group, U of T
Ledbetter, Carl	ETA
Liddiard, Lawrence	University of Minnesota
Luste, George	Physics
McGeown, David	Management Board of Cabinet
McNamara, Brendan	John von Neuman Center, Princeton
McNaughton, David	ADM, Govt. Services
Nowlan, David	VP Research
Oliver, Janice	U of T Space
Parker, Lloyd	OCLSC
Pathey, Alec	VP Business Affairs
Peltier, Dick	Most Frequent User
Pezacki, Anna	OCLSC
Robinson, Mike	Lakehead
Ross, Bob	IBM
Ross, John	OCLSC
Rowal, James	OCLSC
Rowe, Kerry	Western
Tedmon, Craig	Noranda
Ting, J.M.	Civil Engineering, U of T
West, Ed	OCLSC
White, Ted	Chairman of Steering Committee
Wilson, Fred	President, Faculty Assoc.
Wong, Sonny	Ministry of the Environment

NOTE: Interviews with commercial clients not listed.

Profiles of Reviewers

John J. Leppik

Mr. Leppik is presently a consultant to the information processing industry on corporate level information systems issues. He works with Canadian computer hardware and software manufacturers to develop product and business strategies. He also works with users on corporate information systems planning.

He is a graduate of the University of Toronto from Mechanical Engineering in 1961. At graduation he entered the computer business by joining IBM Canada. His career has included systems engineering, sales, marketing, planning and many years in computer systems development. He has extensive experience in computing at universities and has visited most Canadian campuses.

His development career includes five years as Director of the IBM Canada Laboratory. During his tenure the Laboratory grew from a staff of 300 to 600 people and obtained major missions in fourth generation language, office automation and application development. He has managed over 3,000 man years of computer hardware and software development.

The focus of his current consulting practice is on business strategy development, project management, organizational effectiveness, productivity and quality.

Peter A. Gregory

Mr. Gregory provides consulting services in strategic planning, marketing and sales for the computer and communications industries. He is a director of two venture stage corporations: Prisma - in Colorado Springs, who are developing a very high speed computer based on Gallium Arsenide technology, and Myrias - in Edmonton, Canada who are developing a programmable computer based on massively parallel processor architecture.

His experience includes the following:

- Graduation in mathematics in England
- Head of weapon systems analysis in a division of British Aerospace
- An IBM systems engineer, account manager for the largest scientific customer in the UK, a branch manager, and manager of Systems Marketing for the \$1B UK market
- Director in IBM's Product Management organization, and Director for Systems Marketing for IBM Europe/Middle East/Africa, during which he managed product programs for this \$10B market, and

the introduction of the 4300 series system

- Vice-President of planning and corporate development at Cray Research
- Vice-President of sales and marketing at Applitek, a local area network company in Massachusetts
- Consultant to the computer division of the Los Alamos National Laboratory
- Membership of a White House Office of Science and Technology Policy subcommittee on research policy in supercomputing

During these assignments, he has had experience of all aspects of product definition, marketing, selling, pricing, major procurements, organization structures, margin improvements strategies, and competition; and has participated in the creation of many business plans, proposals, computer models and articles on technical and business issues.

In addition to the corporations listed above, he is also consulting in marketing and strategic planning for Mercury Computer Systems of Lowell, Mass., and Elxsi in San Jose, CA. He is, or has recently been, involved in diverse assignments that range from business acquisition, to the organization of computer services at a major university, and to sales force motivation.

Peter C. Patton

Dr. Patton graduated in Engineering Physics from Harvard in 1957 and obtained his PhD from the University of Stuttgart in 1966. His varied educational and computing experience includes:

- Chairman and Chief Scientist, The Consortium for Supercomputer Research, Minneapolis; 1986-
- Director, Minnesota, Supercomputer Institute. Responsible for Research Program and Development of the Research Institute for Advanced Computing Technology; 1985-87
- Adjunct Professor, Computer Science, University of Minnesota; 1987-
- Principal Scientist, Parallel Processing Architecture Program, Microelectronics and Computer Technology Corporation; 1983-85
- Director, University Computing Center, University of Minnesota; 1971-83
- Member, Minnesota Software Technology Commission; 1986-
- Advisory Council Member, National Center for Supercomputer Applications, University of Illinois; 1985-87
- Scientific Computing Division Advisory Policy Committee; National Center for Atmospheric Physics, Boulder, Colorado; 1985-



University of Toronto

Statement of Institutional Purpose

This Statement of Institutional Purpose is now being considered by the Academic Board. At its meeting on Oct. 27 the board adjourned discussion to enable a wide circulation of the document, which is re-printed below. Written comments are invited. They should be sent to Ms. I. Birrell, Secretary of the Academic Board, Room 106 Simcoe Hall, by November 16th.

PREAMBLE

The University of Toronto has earned an international reputation for excellence. Within Canada it stands out for the number and diversity of its programs. The University's continuing aim is to justify that high reputation and to find new ways of enhancing it.

The University can meet such objectives only if it is able to employ outstanding scholar-teachers and recruit students of high promise; if its facilities and environment can foster outstanding achievement; and if its instructional process, the organization of its various component bodies, and the way it conducts its affairs are directed by that cooperative ideal which we call collegiality.

In seeking to achieve the highest levels of performance, the University recognizes the various contexts and constraints — social, economic and cultural — within which it must work. These can be international, national, provincial and municipal, and include the fact of being a publicly funded institution.

INTRODUCTION

Every university needs at intervals to redefine its role. In 1986 the University of Toronto began a process of renewal and self-assessment involving all its sections. Initiated by President G. E. Connell, the process included discussions with hundreds of faculty, students, staff, alumni and governors about the University's objectives. Then, in March 1987, the President released a discussion paper entitled *Renewal 1987*. The University community responded with efforts to define specific ends and means — a process which continues — and undertook to make a statement of institutional purpose appropriate for the 1990's and early 21st century.

The statement which follows is intended to define the special role played by this university in higher education. It does not, however, outline detailed ways to achieve objectives; this important undertaking becomes possible only as the University reexamines and approves step by step the revised plans of all its divisions.

The nature of the University of Toronto
A university is a community of individuals engaged in the acquisition, preservation and communication of knowledge. The weight given to each of these pursuits and the way in which they are implemented distinguish one university from another.

The University of Toronto's 150-year history, its size (with the largest student body in the country), its metropolitan location, and its distinguished academic record contribute to the distinctive way in which it pursues its goals. As an undergraduate institution it attracts students from throughout the province, across the country, and abroad by the quality and range of its programs. It has always accepted as part of its mission the need to educate students for a wide range of professions and to conduct internationally important research in all disciplines. It has thus become the country's major university for graduate education and its leading research institution.

The University's size and the scope of its scholarly activities enable it to maintain a library that is the largest in the

country and among the best in the world. It provides extensive laboratory and research facilities, involving highly specialized fields of knowledge, that smaller institutions depend on but cannot support themselves. It also maintains the University of Toronto Press, which is the chief institution of its kind in Canada and one of the most important scholarly publishers in North America.

The University draws great strength from its setting in a dynamic, cosmopolitan community. The Toronto region has always been a formative influence on it and on the ways in which it fulfils its responsibilities. The University makes various responses to the community's needs: through programs and research involving the economic and social problems characteristic of such a region; through medical care and research; through specialized teaching and a number of cultural programs, to cite a few examples. Together, the University and the local community are able to provide many significant services at the municipal and provincial levels.

OBJECTIVES FOR THE UNIVERSITY OF TORONTO

The preceding discussion provides the context for the following objectives. They are set out under the headings of research, teaching and learning, public service and the University community.

I. RESEARCH

Research is the means by which we gain new knowledge and continue to educate ourselves. The discovery and interpretation of information, the processes of both inquiry and reflection, are intrinsic to all forms of research, whether it is done in a laboratory, a library carrel or even the streets of a city. Yet in a heterogeneous university like Toronto, research encompasses many forms and normally proceeds at the initiative of individuals.

The University emphasizes excellent and innovative research. The objectives specified below have implications for graduate education because research and graduate study are closely connected.

As a leader in research, the University is committed to:

1. Providing an environment conducive to productive research;
2. Emphasizing research, publication and related professional contributions in defining career expectations for its professorial staff;
3. Ensuring the commitment of faculties and schools engaged in undergraduate programs to research and graduate teaching;
4. Maintaining a capacity to respond selectively to new fields of research as they emerge;
5. Requiring national and international peer assessment of the quality of research and graduate programs;
6. Collaborating with other universities, industry, business, professions, public institutions and governments, where appropriate to research objectives;
7. Providing information, library and research services of the highest international standards.

II. TEACHING AND LEARNING

Communicating knowledge to highly qualified students and stimulating them to seek it themselves is central to the work of a university. As educator this university's primary function is to provide for the intellectual development — the learning of creative skills in thinking and problem solving — of such students by ensuring a wide range of excellent programs and facilities and by establishing both diversity and balance in the student body and faculty. In addition

to undergraduate and graduate education, the University also provides many opportunities for continuing education in its professional disciplines as well as most fields in arts and science. This commitment to education as a continuous process is a significant way in which the University serves society.

The University wishes to increase its ability to attract students from elsewhere in Canada and from abroad, in the belief that while they gain an education themselves their presence will enrich the experience of students from the local community. For this reason among others the University seeks to expand the residential opportunities for students in all its divisions.

From all its degree programs the University aims to send into society each year gifted and energetic graduates who will make a difference in the particular personal and professional roles that they choose. As the University's legacy, its graduates should exhibit the ability in their chosen fields to ask important questions, to think critically, to judge fairly and objectively, and to make the most of opportunities with a strong sense of purpose, commitment and responsibility.

The University has a number of objectives common to the teaching of all its programs. It is committed to:

1. Seeking out able and highly motivated students, whose aspirations match the programs available;
2. Setting the highest academic standards;
3. Emphasizing the importance of teaching; providing opportunities for its improvement; and recognizing both excellence in teaching and special achievements in learning.

In addition, the University is committed to a number of objectives relevant to specific parts of its educational task.

A. Undergraduate education

Undergraduate education historically has been central to the University, which reaffirms its commitment to it. The undergraduate years, in particular, are crucial to the intellectual development and the social and ethical growth of students. Through its graduates a university provides society with its most highly educated citizens, capable of disseminating new knowledge and technologies.

The colleges, in which all undergraduate arts and science students are enrolled and to varying degrees take their courses, and the professional faculties, which are fully responsible for communicating professional skills and knowledge to the students they enrol, form the historic nucleus of the University, revised and added to from time to time. They continue to contribute in a wide range of ways to the educational experience of undergraduates, social as well as intellectual, outside of the classroom as well as inside. One of the colleges' special contributions has been the provision of residential experience, and the University seeks to extend this experience to a significantly greater number of professional and graduate students. The colleges have recently played a leading role in the provision of interdisciplinary studies.

In undergraduate education the University is further committed to:

1. Ensuring that teaching and counselling, for both full-time and part-time students, is a normal objective for every member of the faculty, and that good teaching is informed by involvement in research;
2. Providing breadth and depth in all programs, drawing on the rich mix of disciplines and research achievements of the University;
3. Providing the best possible facilities,

services and other academic resources for teaching and learning at this level;

4. Enriching the educational experience by helping to make possible assorted cultural, athletic and other community institutions and events and by expanding opportunities to live on campus.

B. Graduate education

With internationally known programs and scholars, a broad range of faculties and departments, centres and institutes, and major research facilities, the University provides the most extensive opportunities for graduate research in Canada. In many fields it produces a majority of the nation's doctoral graduates. It should continue to emphasize its national and international role by maintaining high standards in teaching and scholarship.

The quality of graduate education in any field is inextricably bound to the quality and level of research in that field. Talented and able graduate students become junior colleagues to their teachers, and are stimulated by access to the best facilities which the institution can provide. Together with their professors, who may serve as successful role models, they undertake scholarly research, share in the discovery of new knowledge and serve as mentors for gifted undergraduates. They also provide tutorial and laboratory assistance for many undergraduate programs. The ability to compete internationally for students is itself a measure of quality in graduate studies, a measure against which the University is determined to have its graduate programs do well.

Most of the objectives listed under research (such as peer review and improvement of library and research facilities) are relevant here, but need not be repeated.

C. Life-long learning

The University's role in the communication of knowledge goes far beyond scholarly publication and the awarding of degrees. Through a wide network of professional faculties, Woodsworth College, the School of Continuing Studies and virtually every academic department, it extends opportunities for learning through life.

The University is further committed to:

1. Providing to persons in professional practice and to the community at large opportunities to share its educational resources;
2. Cooperating with other institutions, professional organizations and learned societies to provide the facilities, organization and expertise which their programs need to be effective.

III. PUBLIC SERVICE

The University best serves its various communities, within and beyond itself, through teaching and research. Its discoveries, both theoretical and applied, have increased knowledge and enhanced the quality of life nationally and internationally.

It seeks to cooperate with other institutions of higher learning, and also with government, industry, social organizations and international agencies, as appropriate to its objectives, to serve society in more effective ways. In addition, individual members of the faculty contribute their expertise in a variety of forms of service; and graduates become leaders of business, industry, government and the professions, in Canada and abroad.

The University is further committed to:

1. Continuing to provide leadership in the development of an educated

See *STATEMENT*: Page 10

Statement of Institutional Purpose

Continued from Page 9

populace and work force and in the conduct of a major share of the nation's research;

2. Extending wherever possible its leading role in the communication of knowledge and technology to the research community and to other users of new knowledge;

3. Providing access to its special facilities for other educational institutions, as well as for the wider community.

IV. THE UNIVERSITY COMMUNITY

In seeking to achieve the above objectives, the University is committed to these principles:

1. Respect for intellectual integrity, freedom of enquiry and rational discussion;

2. The fair and equitable treatment of all members of the University community;

3. A collegial form of governance which recognizes that most of the University's funding comes from public sources, and which promotes the fiscally responsible and accountable pursuit of institutional objectives.

AFTERWORD

During the past twenty five years or so the University of Toronto has changed itself in significant ways. Among the most obvious ones are a huge increase in student numbers, important new buildings and facilities, two additional campuses, the Memorandum of Understanding between the University and the federated colleges, curriculum reorganization and development in many faculties, new graduate centres and schools and bureaucratic reorganization of various kinds. The shifting sources and methods of public financing have provided an unpredictable setting for what has been done. The University has also been subject to changing external pressures and requirements from the world it is a part of, within Canada and without, pressures which show every sign of increasing. Many of these changes seem piecemeal and uncoordinated. The time has come for the University to produce a comprehensive, coordinated plan for renewal, beyond the piecemeal efforts of the immediate past. This Statement of Institutional Purpose is one preliminary step towards that end.

(September 17, 1988)

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IMPERIAL OPTICAL CANADA

HR News & Views

by Will Koteff

From "Personnel" to "Human Resources"

So who ever said life is fair? Just when you thought you had the **Personnel Department** figured out they go and change the name on you. Now they call themselves **Human Resources Department** and whatever that means you haven't a clue and you're going to have to start from scratch again deciphering the whole thing.

Well, life may not be fair, but it can be made easier at times. And to do just that, here are a few clues to help you on your quest to discover the meaning of life, the universe and human resources.

The name change reflects a shift in perspective, something that is happening in most corporations and institutes.

A principle function of HR continues to be the service it provides for the University's management and staff. This includes the traditional activities of staff recruitment, records, salary and benefits administration, and labour relations, which still form the core of the department. However, newer specialties, such as vocational counselling, management development, employment equity and staff planning will be added to meet the needs of a changing workforce, a more competitive environment for employers and obligations imposed by government.

As well, in keeping with a more progressive stance, we are decentralizing some of our traditional functions to the divisions in order to improve the efficiency and effectiveness of HR management.

In the evolution of all this, the University has recognized that employees are more properly the responsibility of an organization's management, not just of its personnel department. So in addition to its continuing role in the more traditional personnel specialties, HR is being called upon to orient, train and develop University supervisors and managers, because it is these people who are accountable for the management of staff on campus.

The change from "Personnel" to "Human Resources" reflects this, and provides the message to the University community that as an organization which devotes 80 percent of its operating budget to wages and salaries, we view the staff as the University's greatest strength and as the key to its future.

And Since You Were Wondering



The employment receptionist at HR handles, on average, 165 phone calls per day, roughly 23 per hour or one every 2.5 minutes. As well, she deals with about 68 people in person every day — 9.5 per hour, or one every six minutes. Combined, all the phone and in-person inquiries average out to about one every two minutes.

And you thought you were busy.

Something Just a Little Bit Different

Unique, interesting, or maybe just a little off-beat: we're looking for jobs on-campus that fall in and around these categories. Let us know if you come across anything that fits, then we'll find out all about it and let everyone else know what a really fascinating place the University is, and what an incredible

spectrum of employment possibilities exist here. If you come across something you think would make an interesting story, contact Will Koteff, Public & Community Relations, 978-5949.

* * *

Career Opportunity Assistant Vice-President, Technology Transfer and Research Relations.

(\$55,736 — 69,670 — 83,604)
Office of the Vice-President (Research)
(To apply for this position, submit a written application to the Human Resources Department, c/o Janice Draper.)

This is just one of many career opportunities available within the University. For more complete lists, check your staff bulletin boards or the lists posted in the Human Resources Department, 215 Huron St., 8th Floor.

* * *

Renewed Commitment

We'd like you to meet two people who are at the heart of HR's efforts to meet your needs:

Les Babbage, as director of staff planning and development. Les will be involved in developing a framework for providing opportunities for employees to increase their job skills and plan career development to meet individual and institutional needs. The Employment Equity Policy, Staff Development and Career Planning Programs are all part of Les's responsibilities. His group will also be putting together training programs to help strengthen the skills of managers. Les comes to U of T from the Ontario Ministry of Health where he held similar responsibilities.

Karen Gorsline, as director of academic and administrative personnel support. This is an expansion of Karen's position as personnel coordinator (academic), giving her responsibilities now for administrative staff personnel support in addition to continuing development of support in the academic staff area. Karen has been with the University since 1975 and had worked previously in the administrative staff personnel area prior to her assignment in the academic area.

* * *

Action! Action!

For those curious about how the University intends to implement the **Employment Equity Policy** it approved in 1986, the newly released Employment Equity Action Plan is just what you've been waiting for. The plan, which was recently presented to senior management, including principals, deans, directors and chairs, for discussion and final review, is ready for action.

And at the top of the agenda is an Employment Equity Workforce Survey. This voluntary self-identification survey is vital in helping the University acquire much-needed data to direct the rest of the plan. It is a crucial first step in employment equity planning.

The survey will encourage individual participation by getting everyone involved in the employment equity initiative. Only with individual participation will fair and accurate information be obtained.

In addition to the quantitative results, the employment equity co-ordinator will continue to review current employment policies and practices to identify potential barriers to employment equity.

So be sure to get involved with the plan. For more information about it and the overall policy see the autumn issue of *Tapestry* coming your way in a week or so. You can also contact the employment equity coordinator, Mary Lynne McIntosh, at 978-2110.



Events

Lectures

Prospect of Regional Cooperation in South Asia with Special Reference to Nepal.

Monday, November 7
Prof. Narayan N. Khadka, Tribhuvan University, Kathmandu, Nepal. 2090A Sidney Smith Hall. 4 p.m. (South Asia, Ontario Programme)

Genre and Accent in the Music of the Troubadours.

Tuesday, November 8
Prof. Elizabeth Aubrey, University of Iowa. Common Room, Pontifical Institute of Mediaeval Studies, 59 Queen's Park Cres. E. 4.15 p.m. (Medieval Studies and Music)

All Shook Up: Three Crises of the Self.

Tuesday, November 8; Wednesday, November 9; and Thursday, November 10
Michael Ignatieff, writer and broadcaster; series of three Larkin-Stuart lectures. George Ignatieff Theatre, Devonshire Place. 8 p.m. (Trinity and St. Thomas' Church)

Communication and Cooperation: Forest Management into the 1990's.

Wednesday, November 9
S.A. Paul, Abitibi-Price Inc.; E.B. Eddy distinguished lecture series. Auditorium, Addiction Research Centre. 12 noon. (Forestry)

Athena Reborn: The Athena Statue in the Parthenon.

Wednesday, November 9
Prof. Barbara Tsakirgis, Vanderbilt University. Lecture room, McLaughlin Planetarium. 5.15 p.m. (Archaeological Institute of America, Toronto Society)

Early Eastern Christianity and Monasticism in Mesopotamia.

Wednesday, November 9
Amir Harrak, Royal Inscriptions of Mesopotamia Project. Auditorium, Medical Sciences Building. 8 p.m. (Society for Mesopotamian Studies)

The Process of Discovery: Supernovae, Comets and Extraterrestrial Life.

Wednesday, November 9
Prof. Robert F. Garrison, Department of Astronomy; 1988 Jacob Bronowski memorial lecture. 8 p.m. Wetmore Hall, New College. 8 p.m. (New)

Parallam: The History and Future of a New Structural Wood Composite (The Bionic Timber).

Thursday, November 10
M.T. Churchland, Macmillan Bloedel Ltd.; E.B. Eddy distinguished lecture series. Auditorium, Addiction Research Centre. 12 noon. (Forestry)

Medicine, Health and Society.

Thursday, November 10
Dr. F.H. Lowy, former dean, Faculty of Medicine; Fanny Rostoker memorial lecture. Town Hall, Innis College. 4 p.m. (Innis)

Political Mobilization in Rural South Asia: The Muslims of Bengal, 1911-1935.

Thursday, November 10
Prof. Rafiuddin Ahmed, University of Chittagong, Bangladesh; 1988 Aziz Ahmad lecturer. Upper Library, Massey College. 4 p.m. (South Asian Studies)

Lash Miller Days, Volume 1: Our Youth and Middle Age.

Friday, November 11
Prof. J.P. Valteau, Department of Chemistry; distinguished lecture series. 3.30 p.m. (Chemistry)

Kierkegaard and the Coming-of-Age Crisis of Modern Times.

Friday, November 11
Prof. Bruce Kirmmse, Connecticut College. Combination Room, Trinity College. 7.30 p.m.

Light or Enlightenment? Growing Up with Lasers.

Sunday, November 13
Prof. Stephen C. Wallace, Department of Chemistry. Auditorium, Medical Sciences Building. 3 p.m. (Royal Canadian Institute)

Santa the Thief: The Psychological Interplay of Receiving and Losing.

Wednesday, November 16
Prof. Theodore Shapiro, Cornell University Medical College. Main Auditorium, Clarke Institute of Psychiatry, 250 College St. (Psychiatry)

The Indira Gandhi Museum.

Wednesday, November 16
Prof. Ralph Lerner, Princeton University. 3154 Medical Sciences Building. 7 p.m. (Architecture & Landscape Architecture)

"Grand peuple ou petites patries": Distinct Society or Distinct Societies — The Lévesque-Trudeau Debate.

Wednesday, November 16
Prof. Ramsay Cook, York University; John Gray memorial lecture. Seeley Hall, Trinity College. 8 p.m. (History)

Learning from Lonergan at Eleven: An Experiment in Teaching Philosophy in Elementary School.

Thursday, November 17
Thomas V. Daly, S.J., United Faculty of Theology, Melbourne; Lonergan colloquium. Elliott MacGuigan Hall, Regis College, 67 St. Nicholas St. 4.15 p.m. (Lonergan Research Institute of Regis College)

A Perspective on the Future of Canada-US Relations.

Thursday, November 17
Stephen Lewis, Barker Fairley Distinguished Visitor in Canadian Culture. 140 University College. 8 p.m. (Arthur Caplan Research Group in Canadian Studies, University College)

Frontiers in Radical Chemistry.

Friday, November 18
K.U. Ingold, National Research Council; distinguished lecture series. 158 Lash Miller Chemical Laboratories. 3.30 p.m. (Chemistry)

Inhaled Anaesthetics: Old, New and Newer.

Friday, November 18
Prof. E.I. Eger II, University of California, San Francisco; Mendelson memorial lecture. Auditorium, 18th floor, Mt. Sinai Hospital. 5 p.m.

Back Pain: Fact and Fiction.

Sunday, November 20
Prof. Hamilton Hall, Department of Surgery. Auditorium, Medical Sciences Building. 3 p.m. (Royal Canadian Institute)

A Symposium on the American Election.

Monday, November 21
Norman Ornstein, American Enterprise Institute; William Galston, Roosevelt Center; and Prof. Jeffrey Tulis, University of Texas at Austin; John M. Olin lecture in American political culture. Council Chamber, Alumni Hall, University of St. Michael's College, 121 St. Joseph St. 4 p.m. (Political Science and USMC)

Oedipus, Oracles and Meaning: From Sophocles to Umberto Eco.

Monday, November 21
Prof. Walter Burkert, University of Zürich; Stubbs lecture. 140 University College. 4.30 p.m. (UC)



Illustration of Champlain's first battle against the Iroquois in 1609. From *Regard sur les collections de la Bibliothèque nationale du Québec*. See exhibitions.

Films

Desire, Difference, Deception: A Feminist Film Series.

Tuesday, November 8
Soldier Girls.

Tuesday, November 15
Born in Flames. Auditorium, Ontario Institute for Studies in Education. 8 p.m. Tickets \$3. (Centre for Women's Studies (OISE), Women's Studies, Cinema Studies, Sociology Students' Caucus (OISE), Feminist Film Group)

Innis Fall Film Program.

Thursday, November 10
A Place With Many Rooms.

Sunday, November 13
Undivided Attention. (Jackman Theatre, Art Gallery of Ontario. 1 p.m.)

Thursday, November 17
From Home.

Sunday, November 20
Consolations; Seated Figures; Tending Toward the Horizontal. (Jackman Theatre, Art Gallery of Ontario. 1 p.m.) All screenings at Innis College Town Hall, except Sundays. 7 p.m. Tickets \$3.

Information: 588-8940 or 978-7790.

Colloquia

A Comedy of Astronomical Errors.

Wednesday, November 9
Prof. W.P. Bidelman, Case Western Reserve University. 3.10 p.m. (Astronomy)

Psychology vs. Cognitive Science.

Wednesday, November 9
Prof. Kathleen Wilkes, University of Oxford; cognitive science colloquium. 152 University College. 4 p.m. (UC)

Strings: The Final Frontier.

Thursday, November 10
Prof. Cliff Burgess, McGill University. 102 McLennan Physical Laboratories. 4.10 p.m. (Physics)

Radionuclids Labelled Antibody for Diagnosis and Therapy.

Tuesday, November 8
Allan Fritzberg, Neo Rx, Seattle. 519 Pharmacy Building. 12 noon. (Pharmacy)

Vanadate and its Derivatives as Insulin-Mimetic Agents.

Tuesday, November 8
Prof. George Fantus, McGill University. Room 814, Charlie Conacher Research Wing, Toronto General Hospital. 5 p.m. (Banting & Best Diabetes Centre)

Developing Literate Minds: Text-Types and Modes of Engagement.

Wednesday, November 9
Prof. Gordon Wells, OISE;

Literacy and Computing series. Room 3-312, Ontario Institute for Studies in Education, 252 Bloor St. W. 2 p.m. (McLuhan Program, Centre for Applied Cognitive Science and Focus on the Nature & Development of Literacy, OISE)

Supercomputing in the Automotive Industry.

Wednesday, November 9
Greg Clifford, Cray Research Inc. Applications Group, Minnesota. 202 McLennan Physical Laboratories. 2 p.m. (Ontario Centre for Large Scale Computation)

Chaos in the Solar System.

Wednesday, November 9
Prof. S.D. Tremaine, Canadian Institute for Theoretical Astrophysics. 102 McLennan Physical Laboratories. 4 p.m. (Nonlinear Studies Group)

Fish Gene Pools: Mismangaging through Stock Transfer.

Thursday, November 10
Dave Philip, Illinois Natural History Survey. 2082 South Building, Erindale College. 5 p.m. (Erindale Biology)

The Cult of Freedom at Plataea and Athens: Zeus Eleutherios and the Propaganda of Hegemony.

Friday, November 11
Prof. Noel Robertson, Brock University. 152 University College. 3.10 p.m. (Classical Studies)

Recent Research in Sensor and Knowledge Based Robotics.

Monday, November 14
Andrew K.C. Wong, University of Waterloo. 211 Roseburgh Building. 2 p.m. (Industrial Engineering)

Modern Culture and the Environmental Crisis.

Tuesday, November 15
Prof. W.H. Vanderburg, Department of Industrial Engineering. 211 Haultain Building. 4 p.m. (IES)

Development of Dust Bathing in Jungle Fowl.

Thursday, November 17
Prof. Jerry Hogan, Department of Psychology. 2082 South Building, Erindale College. 5 p.m. (Erindale Biology)

Distruption of Periphyton Communities in Acidified Lakes.

Friday, November 18
Todd Howell, Institute for Environmental Studies. 7 Botany Building. 3.30 p.m. (Botany)

•E•S•S•A•Y• •C•O•N•T•E•S•T•

The Department of Philosophy is sponsoring an essay contest on the topic of **Fundamental Theories of Aphasia**. Entries may be submitted for either of two separate competitions: one for university faculty members and one for all others (including graduate students and professionals working in the area of aphasia). The winner in each competition will receive a prize of \$500 plus the opportunity to present the paper to a special colloquium sponsored by the Department.

Entries should be sent to:

Aphasia Essay Contest
Department of Philosophy
University of Toronto
Toronto, Ontario
Canada M5S 1A1

Deadline for submission is 15 January 1989



Events

Meetings & Conferences

Meet the Candidates.

Tuesday, November 8; Thursday, November 10; and Monday, November 14
All meetings held in Croft Chapter House. 9 a.m.

Tuesday, November 8
Liberal candidates: Prof. Bill Graham (Rosedale) and others to be announced.

Thursday, November 10
Progressive Conservative candidates: Barbara McDougall, MP (St. Paul's); Joe Pimentel (Trinity/Spadina); and David MacDonald (Rosedale).

Monday, November 14
New Democratic Party candidates: Diane Bull (St. Paul's); Dan Heap, MP (Trinity/Spadina); and Doug Wilson (Rosedale).
Information: 978-6564.

Committee on Academic Policy & Programs.

Wednesday, November 9
Council Chamber, Simcoe Hall. 4 p.m.

Ethnicity and Politics in South Asia.

Friday, November 11
Symposium. Current Trends in Islam and Political Developments in Bangladesh, Prof. Rafiuddin Ahmed, University of Chittagong, Bangladesh; Language, Soil and Region in Indian Politics, Prof. Dipankar Gupta, Jawaharlal Nehru University, New Delhi; Notes on Self-Perceptions of Muslims of India, Prof. N.K. Wagle, Department of History; Ethnicity and Agrarian Relations: Faraizi and Indigo Movements in 19th-Century Bengal, Nurul H. Choudhury, Centre for South Asian Studies. Board Room, Trinity College. 10 a.m. to 1 p.m.
(South Asian Studies)

The Poetry and Criticism of Matthew Arnold: A Symposium to Mark the Centenary of his Death.

Friday, November 11
"The Light Beyond Culture": Matthew Arnold and the Anglo-American Novel, Prof. David DeLaura, University of Pennsylvania; The Homeric and the Tennysonian in Arnold's Work, Prof. H.B. de Groot, Department of English; Matthew Arnold and Celtic Literature, Prof. Em. William Blissett, Department of English; Arnold's Theology: St. Paul and Protestantism, Prof. Em. J.M. Cameron, Department of English. 140 University College. 2 to 5 p.m.
Information: H.B. de Groot, 978-4004.
(UC)

Centenary Symposium.

Friday, November 11
Department of Political Science celebrates 100 years. Debates Room, Hart House. Contemporary Perspectives on Democracy. Panellists: Profs. Joseph Carens, Peter Russell and Richard Sandbrook, Department of Political Science; and Caroline Andrew, alumna, Department of Political Science. Chair: Prof. Carolyn Tuohy, Department of Political Science. 2 to 3.30 p.m.
Political Economy in Transition. Panellists: Profs. Ronald Manzer, Louis Pauly and Cranford Pratt, Department of Political Science; and Rianne Mahon, alumna, Department of Political Science. Chair: Prof. Janice Stein, Department of Political Science. 3.45 to 5.15 p.m.
Information: 978-3450.
(Political Science)

Planning & Priorities Committee.

Monday, November 14
Council Chamber, Simcoe Hall. 4 p.m.

Dreamers and Doers.

Tuesday, November 15
Gordon Cressy, vice-president (development and university relations); meeting of the Women's Network. Croft Chapter House. 12 noon.

Events deadlines

Please note that information for Events listings must be received in writing at the Bulletin offices, 45 Willcocks St., by the following times:

Issue of November 21, for events taking place Nov. 21 to Dec. 12,
Monday, November 7
Issue of December 12, for events taking place Nov. 21 to Dec. 12 to Jan. 9
Monday, November 28

ROYAL CONSERVATORY OF MUSIC

Noon Hour Series.

Wednesday, November 9
Roxolan Roslak, soprano; Fred Osachoff, clarinet; and Peteris Zarins, piano. Concert Hall. 12.15 p.m.

Twilight Series.

Thursday, November 10
Ginette Duplessis, soprano and Andrew Markow, piano. Concert Hall. 5.15 p.m.
Tickets \$2, students and seniors \$1.

The Art and Physiology of the Voice.

Friday, November 11 and Saturday, November 12
A symposium sponsored by the Royal Conservatory of Music and the Department of Otolaryngology. All sessions in the Concert Hall. Friday, 7 p.m. to 10 p.m.; Saturday, 9 a.m. to 9.30 p.m.
Fees: \$75 full registration; \$25 Friday only; \$60 Saturday only.
Information and registration: 978-3771.

Art Gallery of Ontario Series.

Sunday, November 13
Colin Tilney, harpsichord and Peter Hannan, recorder. Walker Court, Art Gallery of Ontario. 3 p.m.

Young Artist Series.

Thursday, November 17
Performed by students in the Performance Diploma and Artist Diploma Programs. Concert Hall. 5.15 p.m.

Royal Conservatory Orchestra.

Friday, November 18
Simon Streatfeild, conductor. Church of the Redeemer, Bloor St. W. at Avenue Rd. 8 p.m.
Tickets \$9, students and seniors \$6. RCM box office 978-5470.

Information on all Conservatory concerts available from the publicity office, 978-3771.

FACULTY OF MUSIC EDWARD JOHNSON BUILDING

Thursday Noon Series.

Thursday, November 10
A Recital of Troubadour Songs. Recital by Elizabeth Aubrey, University of Iowa.

Music

Thursday, November 17
Recording the Chopin Etudes. Lecture by William Aide, Faculty of Music. Walter Hall. 12.10 p.m.

Contemporary Music Ensemble.

Friday, November 11
Robin Engelman, conductor. Walter Hall. 8 p.m.
Tickets \$4.

Faculty Artists Series.

Saturday, November 19
Joaquin Valdepeñas, clarinet; David Bourque, basset horn; Patricia Parr, piano; and U of T Chamber Orchestra. Walter Hall. 8 p.m.
Tickets \$12, students and seniors \$7.

Information on all events in the Edward Johnson Building available from the box office, 978-3744.

Plays & Readings

University College Readings.

Monday, November 7
Rohinton Mistry, short story writer.

Monday, November 21
Neil Bissoondath, novelist. 240 University College. 4.15 p.m.
(UC)

My Foot My Tutor.

Tuesday, November 8 to Sunday, November 13
By Peter Handke. Graduate Centre for the Study of Drama studio production. Glen Morris Studio, 4 Glen Morris St.
Performances at 8 p.m. except Sunday, 2 p.m.
Tickets \$3.
Reservations: Monday to Friday 11 a.m. to 5 p.m., 978-7986.

The Presentation of the Virgin in the Temple.

Thursday, November 17; Friday, November 18; and Saturday, November 19
A 14th-century French liturgical play with a recreation of a Medieval high mass. Church of the Holy Trinity, 10 Trinity Sq. 8 p.m.
Tickets \$8, students, seniors, children and groups \$5.
Ticket reservations: weekdays 9 a.m. to 12 noon, 978-5096.
(PLS)

Exhibitions

JUSTINA M. BARNICKE GALLERY, HART HOUSE

Accents II from the Lavalin Collection.

To November 10
The collection is exclusively of Canadian artists, work produced in Canada or abroad.

November 17 to December 15

The Art of Jeremy Smith.

Paintings and drawings; circulated by the Kitchener/Waterloo Art Gallery. East Gallery.

Aesthetic Emotion: Works by David B. Mine.

Selections from the Hart House permanent collection. West Gallery.
Gallery Hours: Tuesday to Thursday, 11 a.m. to 9 p.m.; Friday and Saturday, 11 a.m. to 6 p.m.; Sunday, 2 to 5 p.m.

SCHOOL OF ARCHITECTURE & LANDSCAPE ARCHITECTURE

Istanbul, Gateway to Splendour.

To November 17
History of the capital of the Ottoman sultans documented by Dr. Ahmet Ertug. The Galleries, 230 College St.
Gallery hours: Monday to Friday, 9 a.m. to 5 p.m.

Miscellany

The Politics of Constitutional Interpretation.

Wednesday, November 9
Prof. Joel Bakan, Osgoode Hall Law School; legal theory workshop series. Solarium, Falconer Hall, Faculty of Law. 12 noon to 2 p.m.
Tickets \$3.
Information and registration: Joyce Williams, 978-6767.
(Law)

U of T Act of Remembrance.

Friday, November 11
Soldiers' Tower. 10.40 a.m.
(UTAA)

ERINDALE COLLEGE

Winters in Toronto.

To November 30
Works of Arto Yuzbasiyan, mixed media. Art Gallery. Hours: Monday to Sunday, 2 to 5 p.m.
Information: 828-5214.

ROBARTS LIBRARY

Regard sur les collections de la Bibliothèque nationale du Québec.

To November 30
A collection of historical documents, maps, books, posters, photographs, sheet music and postcards; sponsored by the Ministère des Affaires culturelles, Bibliothèque nationale du Québec and the Ontario Ministry of Culture & Communication. Main Display Area.
Hours: Monday to Friday, 8:30 a.m. to midnight; Saturday, 9 a.m. to 10 p.m.; Sunday, 1 to 10 p.m.

VICTORIA COLLEGE

Grand Zero.

November 14 to December 2
Mixed media paintings by John Di Leonardo. First floor, Northrop Frye Hall. Hours: Monday to Thursday, 9 a.m. to 9 p.m.; Friday, 9 a.m. to 6 p.m.

An Evening of Bridge.

Wednesday, November 16
Conventional or duplicate bridge, canasta, scrabble. President's residence, 93 Highland St. 7.30 p.m.
(U of T Women's Association)

Wittgenstein and Rule Following.

Friday, November 18
Prof. Dennis Patterson, Western New England College; legal theory workshop series. Solarium, Falconer Hall, Faculty of Law. 1 to 3 p.m.
Tickets \$3.
Information and registration: Joyce Williams, 978-6767.
(Law)



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Arthur Caplan Research Group in Canada-US Studies

STEPHEN LEWIS

A Perspective on the Future of Canada-US Relations

Thursday, November 17, 8 p.m.
Room 140, University College

978-8746 for further information

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Research Notices

For further information and application forms for any of the following agencies, please contact ORA at 978-2163.

Arctic Working Group/Department of Indian Affairs

Faculty who wish to apply for funds to support graduate students and other related costs of research in the north should apply directly to Dr. J. Svoboda, Erindale College. Deadline is November 14.

Federal Networks of Centres of Excellence

Procedures to be followed for applications for the centres of excellence program have been outlined in correspondence dated Oct. 25 from Vice-President J.F. Keffer to PDD&C. This memorandum was circulated to those designated as principal investigators on letters of intent. Additional copies may be obtained from ORA.

For Nov. 30 deadline in Ottawa, internal deadline for receipt of applications by ORA is November 24.

Health & Welfare Canada
Investigators are reminded that research proposals in the mental health field usually submitted in the regular Dec. 1 NHRDP annual project competition will now be accepted until February 1.

Medical Research Council Ethical Considerations
Investigators who submitted conditional approvals for the Sept. 15 competition are reminded that the full approvals must be received by the MRC no later than November 15. ORA will sign the appropriate form on

behalf of the University of Toronto.

Travel Funds

Limited funds are available to Canadian health scientists for a maximum of 30 days spent in a specific laboratory for the purpose of furthering their research. Application is in letter format. Deadlines are December 1 and March 1.

Please refer to the MRC Grants and Awards Guide 1988/89 for further details regarding these programs and procedures.

Deadline Changes

A number of changes have been made to submission dates for MRC personnel awards:
dental fellowships: **from Dec. 1 to January 1**;
US National Institute of Health international research fellowship (nominations): **from April 1 to December 1**;
(full applications): **from Sept. 1 to August 1**.

National Institutes of Health

Investigators conducting biomedical research should be aware of a specific PHS policy relating to distribution of unique research resources produced with PHS funding. Categories include organisms, cells, viruses, cell products, cloned DNA, as well as DNA sequences, mapping information and crystallographic coordinates.

The policy also covers distribution costs, income generated and commercialization of such research resources.

Details are outlined in the NIH Guide for Grants and Contracts, Vol. 17, No. 29, Sept. 16, 1988.

Page Limitations and Legibility of Grant Applications

Investigators are reminded that applications to NIH must conform to page limitation and legibility guidelines. Applications which exceed these limitations will be returned without review. NIH has also indicated that applications with compressed spaces between letters and words of less than 15 characters per inch and reduced type size less than 10 or 12 point range, will also be returned without review.

Ontario Ministry of Health

The University has been informed that the career scientist (open competition) program will be offered this year. Deadline remains November 15.

Eligibility conditions and application procedures are outlined in the ministry's Health Research and Development Grants 1989-90 guidebook available from ORA.

Upcoming Deadline Dates

Agriculture Canada — research grants: **December 1**.

American Health Assistance Foundation — coronary heart and glaucoma research grants: **November 30**.

Arthritis Society — group facilitation (full application): **December 15**.

Canadian Fitness & Lifestyle Research Institute — research grants: **December 3**.

Canadian Heart Foundation — junior personnel awards; stroke research fellowships; teaching fellowships: **December 1**.

Canadian Psychiatric Research Foundation — fellowships: **November 30**; research grants: **December 16**.

CNIB (E.A. Baker Foundation) — research grants; fellowships: **December 1**.

Damon Runyon-Walter Winchell Cancer Research Fund: **December 15**.

Diabetes Canada — scholarships, fellowships, studentships, bursaries and traineeships: **December 1**.

Federal Networks of Centres of Excellence — research grants: for deadline in Ottawa Nov. 30, internal deadline at ORA, **November 24**.

Gerontology Research Council of Ontario — research fellowships (new): **December 1**;

(renewal): **February 15**; advanced student bursary: **January 15** (please note changes)

Hannah Institute — summer studentships: **December 1**.

Health & Welfare Canada, NHRDP — mental health literature review: **November 18**; research grants, studies, demonstration projects, preliminary development projects: **December 1**; mental health field projects only: **February 1**.

Huntington Society of Canada — fellowships; research grants: **December 1**.

International Union Against Cancer — Yamagiwa Yoshida memorial international cancer study grants: **December 1**.

Lady Davis Fellowship Trust — visiting professorship (Israel only): **December 1**.

Lithoprobe — research grants: **December 16**.

Medical Research Council — NIH international research fellowships (nominations); studentships (new); fellowships (new and renewal); MRC/Ciba Geigy studentships, fellowships (pharmacy or pharmacology only); centennial fellowships; travel grants: **December 1**; dental fellowships: **January 1** (please note changes).

Muscular Dystrophy Association of Canada — personnel awards and research grants: **November 15**; post-doctoral or clinical fellowships, pre-doctoral and summer fellowships: **January 15** (please note changes).

National Cancer Institute of Canada — equipment, research grants; Terry Fox new investigators: **November 15**.

National Research Council of Canada — Canada-France science and technology cooperation program: **November 30**.

NSERC — scholarships and fellowships: **December 1**; updates to personal data forms: **December 31**.

Ontario Department of Fisheries & Oceans — sciences subvention program: **December 31**.

Ontario Mental Health Foundation — publication and conference grants, all personnel awards: **November 30**.

Ontario Ministry of Health — career scientists (open competition): **November 15 (confirmed)**;

health system-linked research units: **December 1**; feasibility/formation, workshops/conferences: **any time**.

Ontario Ministry of Northern Development & Mines — Ontario geoscience research grants: **November 15**.

Ontario Thoracic Society — research projects: **December 15**.

Rockefeller Foundation — women's status and fertility research grants: **December 1**.

Smokeless Tobacco Research Council — research grants: **December 31**.

Whitehall Foundation — research grants (limited life sciences only): **December 1**.

Positions Elsewhere

Notice of the following vacancies outside the University has been received by the Office of the President.

Mount Saint Vincent University

Dean, Human & Professional Development
Applications and nominations should be sent by **January 11** to: Dr. Kathryn Bindon, Vice-President Academic, Mount Saint Vincent University, 166 Bedford Highway, Halifax, N.S. B3M 2J6

Washington State University
Dean, College of Agriculture & Home Economics
Professor with tenure position. Applications and nominations should be received by **December 1**. Send

to: Dr. John C. Pierce, Washington State University, Pullman, WA 99164-1048

University of Tennessee
Chancellor, Knoxville Campus

Nominations and applications should be submitted by **December 1** to: Dr. John Prados, Search Advisory Committee Chairman, 719 Andy Holt Tower, University of Tennessee, Knoxville, TN 37996-0170

PhD Orals

Graduate faculty please call the PhD oral examination office at 978-5258 for information regarding time and location for these listings.

Wednesday, November 16

Gayle Ann Shinder, Department of Medical Biophysics, "Studies on the Binding of Bacterial and Lambda Phage Proteins to the cos Site of Bacteriophage Lambda DNA." Prof. M. Gold.

Thursday, November 17

Kevin John Maynard, Department of Chemistry, "Adsorption of Carbon Dioxide and Carbon Monoxide on

Alkali Metal Predosed Silver Surfaces." Prof. M. Moskovits.

Friday, November 18

Somer Brodribb, Department of Education, "Nothing Matters: A Critique of Post-Structuralism's Epistemology." Prof. M. O'Brien.

Thursday, November 24

Karen Kristina Wendling, Department of Philosophy, "Citizens and Dependents: Equality and Inequality in Liberal Social Contract Theories." Prof. L.W. Sumner.



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COMMISSIONS FOR THESE HAND-PAINTED WATER COLOUR LITHOGRAPHS ARE REQUESTED BY LETTER TO F.M.SPEED, 139 NEWTON DRIVE, WILLOWDALE, M2M 2N4. FOR MORE INFORMATION, TELEPHONE: 416 222 1071.

Thanks!

I WOULD LIKE to convey my thanks to all the staff, faculty and students who volunteered their time to make U of T Day 1988 such a success.

Your spirit, enthusiasm, and loyalty serve as examples to all.

After three years, there is little doubt that U of T Day has proved its viability. I invite you to bring me your impressions of this year's event and your suggestions for 1989.

Again, my sincere appreciation for your participation.

Gordon C. Cressy
Vice-President, Development
and University Relations

Oops!

I WAS very happy to see a large photograph in the Oct. 24 issue of the *Bulletin* of the Malcove icon which has been reproduced as a postage stamp. Unfortunately the text with the photo contained some very wrong information. The Malcove Collection does not belong to the Pontifical Institute of Mediaeval Studies. Dr. Malcove left her collection to the University of Toronto. Part of the collection is housed and exhibited at the Royal Ontario Museum. The rest is housed on campus through the generosity of PIMS which provides the space. In this way it can be made available for teaching.

Sheila Campbell
Curator
University of Toronto Malcove
Collection

Spending approvals

THE BUSINESS BOARD has agreed to spend \$50,000 on a temporary solution to ventilation problems at the Best Institute on College St. It would cost \$6 million to repair the entire system.

The airflow in the 36-year-old building will be balanced and pressure detectors installed on all fumehoods warning occupants of malfunctions. At present, air exhausted from one fumehood can be potentially drawn into another room.

If the ventilation system were not repaired, the Ministry of Labour could close the building under the Occupational Health & Safety Act, Richard Criddle, vice-president (administration) told the Oct. 31 meeting of the board.

The board also approved the construc-

tion of the Koffler Institute of Pharmacy Management at a total cost \$4.6 million, \$1.2 million more than anticipated two years ago.

The three-storey institute will be built at Bancroft St. west of the new Earth Sciences Centre.

When the project was tendered in September, six firms were asked to bid. At that time, the University expected the price to be \$3.9 million. But three companies withdrew from the bidding and the two lowest of the three remaining bids were \$700,000 over budget.

Criddle said the \$4.6 million price was a fixed one and would not be affected by further increases in the construction industry.



PETER LEGRIS

Saving lives in their spare time

Donating blood can be a friendly experience, as two students discovered last month in the lobby of the Medical Sciences Building. Some 780 people participated in the clinic Oct. 24 to 28. Your next chance to give comes Jan. 16 to 20, when organizers at the Students' Administrative Coun-

cil and the Red Cross hope to hold a roving clinic, with a different location every day. They are seeking teams of volunteers to sponsor a day at their college, faculty, school or office. Students, faculty and staff are invited to help. Call Chris Thiesenhausen at SAC, 978-4911.



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The Faculty Club

41 Willcocks Street
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CHRISTMAS BUFFET DECEMBER 1988

Wednesday 7th Thursday 8th Friday 9th
Monday 12th Tuesday 13th Wednesday 14th
Thursday 15th Friday 16th Monday 19th
Tuesday 20th Wednesday 21st

12 NOON - 2:30 P.M.

Christmas Buffet in the Main Dining Room

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\$13.50—plus 8%—plus 15% service charge

Reservations should be made early by calling the Club Office (416) 978-6325 between 9:00 A.M. and 5:00 P.M., Monday through Friday

Special Note:

Due to the demand for reservations at this event, tables will only be held for 15 minutes after the stated reservation time requested.

Reservations for less than 6 people may have to share a table with other members.

Classified

A classified ad costs \$9 for up to 35 words and \$.25 for each additional word. Your name counts as one word as does your phone number, but the components of your address will each be counted as a word. No charge for postal code.

A cheque or money order payable to **University of Toronto** must accompany your ad.

Ads must be submitted in writing, 10 days before Bulletin publication date, to **Marion de Courcy-Ireland, Department of Communications, 45 Willcocks St., Toronto, Ontario M5S 1A1**. Ads will not be accepted over the phone.

Accommodation Rentals Available — Metro & Area

Bloor-St. George area. Luxury studio apartments from approximately \$750 per month. Could be partially furnished. Move-in condition. Sept. 15 onwards. Parking available. Phone 971-6094.

Charming, renovated heritage house on quiet street 5 blocks from U of T — 3 bedrooms, living-room, dining-room, kitchen, 1 bath, basement, w/d. Furnished. Parking for 1 car. Available January 15, 1989 for 3-5 months (negotiable). \$2,000 monthly + utilities. 923-8982.

3-Bedroom town house, furnished, to sublet for six months, January to June 1989. Davenport-Dufferin area. \$758/month + utilities. Call Patrick, 537-3326.

Furnished luxury 1-bedroom apartment on two floors of Victorian house. Library, laundry, deck, parking. 5 minute walk to U of T. Available January — April 1989. Asking \$1,350 inclusive. Phone 979-0967.

Sabbatical Rental: Quick access to TTC direct to U of T/downtown or Erindale campuses. Three-bedroom detached and furnished house, air-conditioned, all appliances, two-car driveway with a front garage. Close to shopping, schools and transit. \$950 per month. Available November 1988. Phone (416) 678-2704 or leave a recorded message.

House for rent. 5-Bedroom, on Palmerston Gardens, near Dupont and Bathurst, ½ hour walk from U of T, 10 minutes from subway, April 1 — July 31, \$1,750/month, utilities included, parking, yard, patio, beautiful neighbourhood, furnished, fireplace. 978-8100, 538-8065.

Lawrence Park, pleasant large family home, furnished with study, family room, 5 appliances, private drive, 8 minutes to subway. Available January 1989 for 5 to 8 months, asking \$1,800 monthly plus utilities, call 481-0169 evenings.

Large family home for rent. Owners going to B.C. for three years. 4-bedroom detached house on large treed lot. St. Clair/Oakwood area. \$1,575/month. Call 654-4899.

Bay — Wellesley: Centre town, prime location. New luxurious two-bedroom condominium with solarium, garage, recreation facilities, pools. Near university, park, transportation. Immediate. \$1,800, 487-3701.

Apartment — Christie/Bloor. Newly renovated basement studio — large bathroom, Jacuzzi tub. Close to subway. Parking available. \$675. Looking for a quiet, conscientious, non-smoking female to make this unusual apartment home. 961-7683, Sheila.

Bloor/Spadina. Brunswick Ave. Renovated 1-bedroom apartment, split level, washer, dryer, deck, parking. \$1,250 per month. 920-5744.

Bloor/Spadina. Brunswick Ave. Renovated, fully furnished & equipped 2-bedroom apartment, plus den. Separate dining-room, washer, dryer, large deck, fully fenced yard with flower beds. \$1,700 per month. 920-5744.

Central house — St. Clair/Bathurst. Available January 1st, 1989 or end of December. 3 floors, 4 bedrooms, 2 bathrooms, basement, garden, could be partially furnished, pleasant and clean. Lease, references, first and last month. Non-smokers. \$1,490 + utilities. Call 926-1300, ext. 3286.

Annex, 38 Howland Ave. Walk to campus. Newly renovated in house, 3 bedrooms, 2 baths, 2 kitchens, 2 living areas, 2 decks. Suit family with nanny or granny, or professional group. \$2,000+, 588-3865.

Yonge — Lawrence subway, January — July 1989. Modern, furnished 2- to 3-bedroom town house. Air-conditioned, lovely garden. \$1,300/month plus utilities. Use of pottery studio negotiable. 488-0913/978-3577.

Condo, one-bedroom + den, walk to University, Bay & Wellesley. New building, 5 appliances, parking, facing west, \$1,150/month plus utilities, lease, please call 599-5550.

Riverdale. Central location. Upper 2-level, 2-bedroom duplex for rent. Custom kitchen, large deck, five appliances, parking. Renovated with charm. Very pretty. \$1,200 inclusive. Immediate or December 1st, as required. 461-4563.

Furnished Apartments. Super location! Yonge-Lawrence. 2 blocks south of Lawrence. Newly renovated bachelor, 1 & 2 bedrooms. Fully equipped kitchen, colour TV & linen included. Parking/maid service available. No lease — weekly/monthly. Glen Grove Manor, 2837 Yonge St., 489-8441.

Avenue/Wilson bungalow with finished basement. 3 bedrooms, 2 baths, garage, 5 appliances, close to subway. Available January 1, 1989, 1 to 3 year lease, \$1,300. 783-1569.

Beach executive. Boardwalk — imposing classic. 4 Bedrooms, elegant living-room 21 ft. x 15 ft., den, dining-room with splendid oak around, French bevelled glass doors, space-age all-white kitchen, fireplace, decks with unique view to the park and lake 150 feet away. Parking. \$2,500, immediate, 694-0701.

Avenue Road — St. Clair luxury 2-bedroom upper, balcony, laundry, parking, subway. Non-smokers. \$1,085+. No pets. 489-2854.

Short-term rental (November 22 — May 15). Bloor/Bathurst — large, furnished one-bedroom apartment in house (main floor). Separate entrance, broadloom, cable. Prefer non-smoker. 588-4646.

Large two-bedroom upper duplex, bright, quiet, five minutes from lake/Lakeshore Blvd., Mimico GO station and Royal York bus to subway. 15 minute drive to downtown. Available November 1. Evenings, weekends: 255-1820. Days: 861-0819, leave message.

Bloor-Dufferin. Renovated basement apartment, one bedroom plus study, separate entrance, backyard. Suit couple. 5 minute walk to subway. \$634 per month, utilities included, parking extra. Available December 1. Non-smokers. 534-8961.

Chaplin Crescent. One-bedroom apartment, fully furnished. Inside parking. Close to all transportation. Available December 5 — March 31, 1989. \$900/month. 783-9112.

Accommodation Rentals Required

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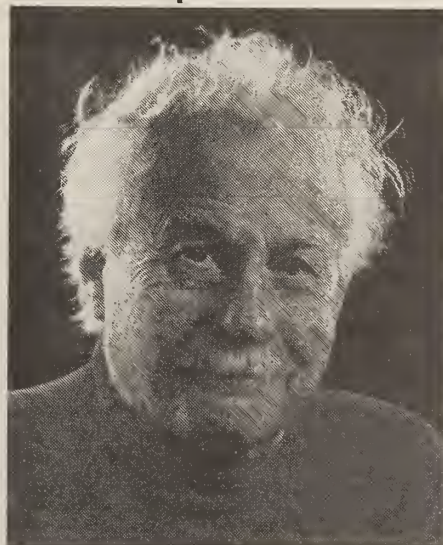
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'Lord, to whom shall we go?'

by J. Peter Dyson

TO CALL THE situation of Marsha Hewitt in the Faculty of Divinity at Trinity College a "case" is a misnomer, at least within the University of Toronto or even within Trinity College ("Review of Hewitt case sought by faculty group" *Bulletin*, Oct. 11). There is a case which she has put before the Ontario Human Rights Commission (OHRC), which presumably will be heard by that body in due course. Formally speaking, however, there is no "case," because that would require a legal framework within which due process can function.

The OHRC constitutes such a framework, hence cases can be brought before it. The U of T has a framework (Article 7 of the Memorandum of Agreement between Governing Council and the University of Toronto Faculty Association) which guarantees due process to every faculty member and librarian at Trinity, except those in divinity, by virtue of their belonging to the Faculty of Arts & Science.

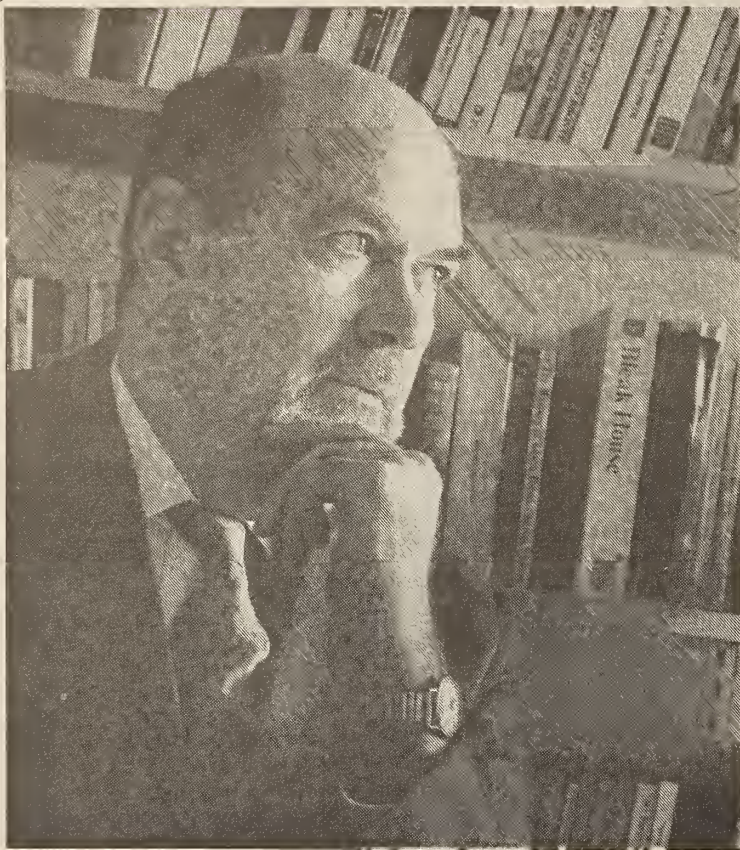
For some reason lost in the mists of recent history, Trinity has never signed a memorandum of agreement with UTFA, as did the administration and Victoria in the late 1970s. St. Michael's College apparently set up procedures of its own. Hence the poignantly isolated situation of Professor Hewitt. She has been through a re-hiring process in a faculty which, according to report, has no constitutional appointments policies or procedures. Now, with a legitimate complaint, she finds she lacks a constitutional right to be heard by any University or college tribunal.

Academic freedom

It is unlikely that any other faculty member or librarian in this university, except her colleagues in Trinity's Faculty of Divinity, would find themselves in a similar situation. (The refusal last May of St. Augustine's Seminary "to subscribe to the academic provisions in the University's personnel policies," in Provost Joan Foley's words, precipitating its rapid severance from the U of T, together with the present Trinity situation, seem to suggest an endemic theological inability to come to terms with academic freedom and its offshoot, due process.)

With proper advice, a person in Hewitt's situation would immediately launch a grievance according to the procedure outlined in Article 7 of the memorandum, and having by now exhausted, *de facto*, steps one, two and three of that procedure, would be in a position to bring her case before the Grievance Review Panel of the University. The panel is a quasi-judicial body made up of our fellow faculty members and librarians, appointed jointly by UTFA and the administration. It operates under the Statutory Powers Procedures Act, using legal counsel as necessary. The staff association has

The search for due process at Trinity College



J. Peter Dyson

its own grievance procedure culminating in its own review panel.

Reaction

My reaction to the Hewitt situation was twofold: first, how grossly unfair for the individual (whom, incidentally, I have never met); and second, how benightedly anachronistic of Trinity College. To comment on the specific situation of Professor Hewitt would be improper at this point, but there are one or two elements about the role of Trinity that deserve comment.

The first is that Trinity's position betrays a profound ignorance of institutional history on this campus in the last 15 years, particularly as it applies to the basic rights of both University members and the institution itself, and to the creation of procedures to safeguard those rights. The policies governing the procedures for committees engaged in any aspect of appointment, promotion and dismissal, are designed to safeguard the principles of fairness for all parties. An integral part of such policies is a set of procedures governing appeals that may be made by any member of the University against *prima facie* violations of policies or procedures within the original committees. UTFA, with the wisdom of hindsight, now always insists on an appeal mechanism being built into any given policy if for some reason it isn't covered by Article 7; the negotiations to establish the procedures governing applications for early retirement provide an example.

Denied tenure

As recently as 15 or 20 years ago, there were scarcely any appeal procedures worthy of the name (and precious few other procedures of any kind) extant in the U of T. When six members of the English department in University College were denied tenure

in 1973 (of which I was one), the appeal procedure consisted simply in writing to then President John Evans, requesting him to reconsider the decision personally. Since the candidates were without any specific information about their cases — it turned out that the letter sent to each candidate by the chair explaining the "specific" reasons for denial in each particular case was a form letter — it was not easy to formulate an argument to present to the president. The president, after reflecting on the matter in the privacy of his Simcoe Hall office — one was solemnly assured he had devoted up to 40 hours pondering a single case — was entitled to send or not send the appeal on to a "special" review committee allowed for by number eight of the Haist Rules. There was no further appeal should the president refuse to send the appeal on to the committee, and the he was not obliged, under the policy, to give any reasons for his decisions.

When one enterprising faculty member of the UC English group asked the provost's office how many tenure appeals had been entertained in 1972-73 and of those how many appeals had been upheld, the response was instructive: "seven or eight" appeals had been entertained; four did not get past the president, three were sent to the "special" committee. Not altogether surprisingly, of the entire group, *none* were upheld; this did not encourage a sense of trust in the capacities of either the president or the "special" committees to function as appeal courts. The necessity of fair, clearly defined, responsible procedures was obvious.

The faculty member went on to hire a Toronto lawyer, Brian Bellmore, who was interested in civil rights in the educational arena. It is not an exaggeration to say that Bellmore's legal work provided the stimulus for far-reaching clarifications of, and alterations in, the way the Haist rules were applied, and the ground rules on which successful appeals could be based.

Since there was no investigative mechanism in 1973, President John Evans appointed a personal investigator from the Faculty of Law to examine the situation, on the basis of whose report (confidential to the president, of course) procedural irregularities were determined to have been present. (Indeed, it appeared that a number of the original committee members were ignorant of the very notion of procedural regularity, a charge which has resurfaced in the present Trinity tangle.) The UC decisions, consequently, were all set aside and the cases reheard by new tenure committees.

It should perhaps in fairness be pointed out that UTFA's grasp of the situation was no further ahead than the president's. When the UC cases were finally settled, two years after they began, Bill Nelson, then president of UTFA, wrote, in June 1975, to the same appellant who had ventured to challenge the presidential role — which disap-

peared from the subsequent tenure appeal procedure — that while UTFA was prepared to help in cases of bias, "the Faculty Association Executive [has] decided that we should not press the University to pay the legal expenses of faculty members engaged in appeals where University channels of appeals were open to them." The executive of that time appears not to have engaged in discussion about the validity of the channels of appeal themselves. It did, however, build (knowingly or unknowingly) on Bellmore's work in negotiating the Memorandum of Agreement two years later.

Standing committees

To its credit, the administration also, with considerable prodding, saw the necessity, and perhaps the wisdom, of creating standing committees to handle appeals: first the Tenure Appeal Committee with the narrow mandate implied in its title, and then, in November 1977, the Grievance Review Panel, to handle all the remaining broader issues within the University. Both committees are still functioning and doing excellent work.

Interested members of the University community, administration and individuals, came to see that, in the last analysis, appeal procedures are safeguards not only for the individual but for the institution. The great benefit of a procedure, from the individual's point of view, is that it gives the grieving (both senses of the word are too frequently apt) faculty member or librarian the assurance that the complaint is being dealt with impartially rather than by clumsy attempts to intimidate or insinuate. Institutionally, the existence of a procedure removes the temptation to see might as right and lifts the issue out of the realm of the personal, of accusation and counter-accusation, with all the bitterness and community disruption that such a *cause célèbre* tends to bring in its wake.

That Trinity College does not have formal policies in place to govern the procedural aspects of appointments, with appeal procedures as an integral part, is extraordinary and appalling. That it apparently continues to use its institutional power to engage in backroom negotiating, rather than hurrying to assure the appellant of due

process, is a disquieting echo of U of T back in the "bad old days." That it prefers Professor Hewitt to take her grievance to an outside body, the Ontario Human Rights Commission, with all its attendant publicity, rather than accept the juris-

diction of a legitimate, independent review committee within the University context — the standing body in the University, the Grievance Review Panel, provides an obvious route — is baffling and disappointing. To anyone concerned with due process, or with the operation of the principles of natural justice in the context of post-secondary education in Ontario, or with the good name of the University of Toronto in 1988, it is an affront.

*(John, VI, 68)

Peter Dyson is an associate professor in the Department of English, a fellow of New College, and a former vice-president (grievances), 1982-84, and president, 1984-85, of the University of Toronto Faculty Association.



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